

# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

Price: \$9/year

May 16, 1973

Vol. VII, No. 20



## Sen. Hart to Keynote National Conference

NEW YORK — Sen. Philip A. Hart (D-Mich.) will be the keynote speaker at the National Computer Conference here Monday, June 4 at 10:30 a.m.

Hart is chairman of the Senate Committee on Antitrust and Monopoly, which is currently having hearings on his bill to break up concentrated industries. (See story on Page 3)

Hart has also been active in issues on the environment, civil rights and liberties, and consumer protection. He is chairman of the Senate Subcommittee on Energy, Natural Resources and Environment.

## Charges Dropped (Briefly) Against Alleged Criminals

SAN ANTONIO, Texas — It was only a temporary problem, but computers took the blame when charges were "dropped" against some 35 alleged criminals here recently.

Omissions on 35 indictments, making them faulty and thus temporarily invalid, were blamed by local newspapers on "a computer error" and a "computer programming error," but the heart of the problem was a forms-handling error, according to a source in the District Attorney's office.

And the error involved a magnetic tape selectric typewriter (MT/ST), a simple computer at best.

In preparing indictment forms for transcription onto the MT/ST, someone apparently cut off the bottom of the forms, and two lines were thus dropped, the source said.

## Aussies Mull Dental ID Index

Special to Computerworld

SYDNEY, Australia — Dental authorities in this country may introduce computerized dental records to help police identify people. The records would be stored in a central computer bank and be used by police as an alternative to identification by fingerprints.

Presidents of all state dental boards will discuss the proposal at a meeting this month.

## On the Inside This Week

Cobol Users Can Pick Collating Sequences — Page 15

AT&T Says 30% Non-Bell Equipment Causing Harm — Page 19

|                     |    |
|---------------------|----|
| Communications      | 19 |
| Computer Industry   | 27 |
| Editorial           | 10 |
| Financial           | 38 |
| Small Systems User  | 25 |
| Societies           | 8  |
| Software/Services   | 15 |
| Systems/Peripherals | 23 |

## IBMer Disclaims 'Task Forces'

# IBM Summons Users in Suit Defense

By E. Drake Lundell Jr.

Of the CW Staff

TULSA, Okla. — The first IBM employee to be called in defense of the firm in the Telex-IBM antitrust case said last week he had never heard of many of the task forces that Telex described in its presentation of its case.

Francis Rogers, now IBM director of marketing, said he did not know of the existence of such task forces as the Peripherals Task Force, even though he was president of the IBM Data Processing Division at the time it was alleged to have been undertaken.

In addition, on cross examination he admitted he knew of no cost reductions in manufacturing or marketing that made it possible for IBM to reduce the prices for the 1403 printer. He said it had been in use for eight years before the reduction was announced and that the price cut under the fixed-term plan was made after Telex had introduced a competitive product.

In the opening rounds of its defense, IBM also called several users to the stand

to show that competition in the DP business was growing and to generally laud the IBM products and services offered.

For example, David Hill, information systems manager of the Chevrolet Division of General Motors, indicated there were 69 suppliers of EDP equipment at GM when he joined the company two years ago, but now there are 116 different equipment suppliers.

Frank Heinzmann, vice-president of computer services at Eastern Airlines said his organization uses products from 35 different suppliers at the present time and competition has been growing.

He also claimed that generally it is not hard to interface outside equipment to IBM systems, even though he admitted that in a few cases Eastern had had to develop interfaces itself for the equipment.

Eastern, he added, got excellent service from IBM and received very good equipment from the firm.

Neal Sullivan, DP director of Rockwell International, noted that his firm had had some trouble with getting service for

Telex equipment it had installed and that it was taking out all of the Telex gear it was using. He rated Telex electronic equipment as good, but said the electro-mechanical gear such as printers was not as good.

### IBM's Problems

In his testimony, Rogers also mentioned that IBM took a long time (18 months) to train its salesmen and claimed that after IBM salesmen had made a sale the independent peripheral makers took advantage of that groundwork in order to get their equipment installed.

The three guiding principles of IBM, he stated, were respect for the individual, an effort to give the customer the best equipment possible and a striving for excellence.

The IBM defense should continue into this week with IBM President Frank Cary scheduled as one of the last IBM witnesses after the IBM economists make their presentations.

## Defense Move A First for IBM

TULSA, Okla. — For the first time in the history of antitrust suits against IBM, the firm has been forced to present its defense in open court here in the \$1.2 billion antitrust suit by Telex.

In all the other antitrust actions against the firm, IBM has either settled out of court before a trial ever began or has managed to have the suit dismissed after the plaintiff presented its case and before IBM presented its evidence (the Greyhound suit).

In the present case IBM also asked the judge to dismiss the action against it after Telex had finished its presentation, but Judge Sherman Christensen overruled the request.

(Continued on Page 2)

## Equity Investor Suit Says IBM Safeguards Lacking

By Marvin Smalheiser

CW West Coast Bureau

LOS ANGELES — IBM Corp. has been accused of being partly responsible for the Equity Funding Corp. of America scandal in a Superior Court suit filed here.

The class action suit, filed by five Los Angeles residents, seeks over \$4 billion in damages.

The suit charges IBM contributed to the scandal by failing to build safeguards into its equipment. It also says IBM neglected to warn the users of the possibility of fraud.

The Equity Funding debacle involved the creation of \$120 million in bogus assets and the sale to reinsurers of possibly \$2 billion in phony life insurance policies.

Equity Funding officials have been accused of using computers to make up the phony life insurance policies to provide cash flow for the corporation's activities.

The suit named IBM, its affiliates and subsidiaries which manufacture, sell, lease, rent, program, service, repair and operate the computer and data processing equipment as defendants. The suit was filed by attorney Alvin B. Green, who also filed the initial class action suit against Equity Funding for the same five persons representing stockholders, warrant holders, bond holders, mutual fund holders and life insurance policy holders.

A spokesman for Green's office said some sort of legislation may be proposed to prevent similar occurrences. He described the computer as "an instrumentality as dangerous as the Saturday night special handguns."

Green said, "Were it not for the equipment being manufactured as presently constituted and IBM failing to advise the general public of the problem, fraud would probably never have arisen."

Green also said he feels the suit will "serve as a warning to the computer industry that it had better take steps to ensure the public is not defrauded in this manner."

IBM, when it heard of the suit, said:

"The claim is preposterous and could seriously mislead the public. No one should be misled into supposing that companies that supply equipment for legitimate business purposes can be held liable for allegedly fraudulent use of that

(Continued on Page 3)

## Navy Users Told

# 100% Security Unreachable

By Edward J. Bride

Of the CW Staff

NEWPORT, R.I. — "I don't think a system exists that can't be broken," said the head of the Navy's computer selection office recently.

"And I don't think we'll ever reach 100% security," added Cmdr. Jan Prokop, director of the ADP Equipment Selection Office (Adpeso) in the Navy Department.

Occasionally, directors of large computer installations claim they have completely secure systems, Prokop continued, "then some student walks in with copies of their files."

Furthermore, many organizations are "past the point of no return" as far as computer security is concerned: they have no manual files for backup in case security is breached, he said.

Speaking before the fifth annual data processing seminar of a joint Navy user group here, he philosophized that "minimal security can be provided at minimal cost."

Since "we'll never reach a 100% secure installation," Prokop advised computer users to spend their money where it will do the most good in particular situations, such as physical access control and secur-



CW Photo by Edward J. Bride

Cmdr. Jan Prokop

Related stories on pages 4 and 5.

ity clearances for personnel.

A guideline to assess the security characteristics of remote terminals is in the early stages, reported Dr. Ruth M. Davis, director of the Institute for Computer Sciences and Technology at the National Bureau of Standards (NBS).

While algorithms for data encryption are (Continued on Page 5)



V.J. FARMER, managing editor. RONALD A. FRANK, technical news editor. EDWARD BRIDE, general news editor. E. DRAKE LUNDELL JR., computer industry editor. MARVIN ARONSON, assistant managing editor. DONALD LEAVITT, software editor. MICHAEL WEINSTEIN, systems editor. MARY UPTON, financial editor and assistant computer industry editor. LESLIE FLANAGAN, JUDITH KRAMER, copy editors. KEN SHONK, TONI WISEMAN, MARGUERITE Y. ZIENTARA, staff writers. PATRICK G. WARD, editorial assistant.

ALAN TAYLOR, J. DANIEL COUGER, DAVID E. FERGUSON, FRANK GREENWOOD, columnists.

E. DRAKE LUNDELL JR., Washington bureau. MARVIN SMALHEISER, West Coast bureau. J.H. BONNETT, European bureau.

NEAL WILDER, vice president - marketing. DOROTHY TRAVIS, marketing administrator. JUDY MILFORD, advertising coordinator. ELLEN FUSFELD, market research.

LEETE DOTY, production manager. HENRY FLING, production supervisor.

W. WALTER BOYD, publication manager. PATRICK J. MCGOVERN, publisher.

EDITORIAL OFFICES: 797 Washington St., Newton, Mass. 02160. Phone: (617) 332-5606. Telex: 92-2529. Washington: Room 1129, National Press Bldg., Washington, D.C. 20004. Phone: (202) 638-0901. Telex: 89-544. Los Angeles: 963 N. Edgecliffe Drive, Los Angeles, Calif. 90026. Phone: (213) 665-6008. Europe: Computerworld, c/o IDC Europa Ltd., 59 Grays Inn Rd., London, W.C.1, England. Phone: 01-242-8908. Japan: Computerworld, c/o Shukan Computer, Dempa Building, 1-11-15, Higashi Gotanda, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: 26792.

Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160. © 1973 by Computerworld, Inc.

Reproduction of material appearing in Computerworld is strictly forbidden without written permission. Send all requests to publication manager.

25 cents a copy; \$9 a year in the U.S.; \$10 a year in Canada; all other foreign, \$25 a year. MARGARET PHELAN, circulation manager. Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160.

COMPUTERWORLD, INC.  
Patrick J. McGovern ..... president  
W. Walter Boyd ..... executive vice president  
Robert M. Patterson .. vice president-editorial  
T. Neal Wilder ..... vice president-marketing



POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Mass. 02160.

Join the growing number of Computerworld subscribers.

Use the coupon below.

# IBM Dismissal Bid Hints at Strategy

By E. Drake Lundell Jr.  
Of the CW Staff

TULSA, Okla. — In making a move for a dismissal of the Telex charges against it, IBM may have telegraphed a strategy that could be used later when it asks the judge to find it not guilty of the charges.

In a memorandum supporting its request for dismissal, IBM lead attorney Thomas Barr said that "Telex is seeking to have this court define a relevant market" in a fashion "which is radically inconsistent" with the law and with previous cases.

## 'Unique Legal Precedent'

The memorandum indicated that IBM felt Telex's basic argument is that IBM monopolized its own product line. "If Telex's theory is accorded any merit," Barr said, "the unique legal precedent will result in potential monopolization liability for most American businesses of any size — each might logically be held to have monopolized his own product line."

Barr also claimed "there is absolutely no support of Telex's novel theory of market definition" in either earlier cases or the Sherman Antitrust Act itself.

In addition, he claimed that in all other cases under the act the market had remained stable for a long period of time.

The most similar case in the past was the DuPont "cellophane" case, Barr said. In that case he noted DuPont was found

## N.Y. Court Rules Documents Public

NEW YORK — The full court of appeals here has turned down an IBM request that 1,200 documents it filed in the Control Data case be kept secret.

IBM claimed — when the documents were turned over to the Justice Department by Control Data for the government antitrust case — it had accidentally let the 1,200 documents be filed in the case even though they were privileged.

Because the documents had been turned over by accident, IBM had asked Judge Daniel Edelstein, who is presiding over the government's case, to prevent the Justice Department from using the documents.

Edelstein balked, however, and in pretrial order number five claimed IBM had waived its right to keep the documents secret when it turned them over to Control Data. Because of this, he

said, they were public documents and could be used by the Justice Department in its suit.

IBM appealed the decision, however, and an original panel of three judges in the appeals court upheld the IBM position claiming the documents should be kept secret.

The Justice Department, however, immediately appealed that decision to the full eight-member court of appeals. That group, in its decision last week, said it did not have jurisdiction over the matter and therefore upheld the Edelstein decision that the documents should be public.

The court of appeals said if IBM wanted to pursue the matter it would have to go to the Supreme Court. IBM has not filed a request with the Supreme Court asking it to take up the issue of the privileged documents, but it has routinely reserved the right to do so in the future.

not guilty.

## People in Glass . . .

He also claimed that if the court accepted the Telex definition of the market, then General Motors, Ford and the other car makers would have to be found guilty of monopoly practices since they

## Is IBM Market Share Declining?

TULSA, Okla. — Using data from the census of companies in the computer industry compiled in the IBM-Control Data antitrust action, an IBM witness last week indicated that IBM's share of the market was actually declining and that competition was growing.

Earlier in the case, a Telex economist had used the same data in a presentation that indicated IBM controlled the lion's share of the business in the independent

peripherals segment of the industry.

Daniel Jerbas, a general partner in Price Waterhouse, the accounting firm which audited the census data, indicated that the census figures show that in 1952 there were only 13 firms in the business and that by 1970 this had grown to 1,773 companies.

IBM's share of the gross revenues in the business were 64.1% in 1952, he said, but he claimed that by 1970 this share had dropped to 35.1% of the gross revenues from data processing.

However, he admitted on cross examination that his firm had never tried to break out the revenues for peripheral products alone or for any other single segment of the market.

In the period from 1952 to 1970 he said that revenues from DP sales and leases had risen 212 times from \$48 million yearly to over \$10.2 billion in 1970.

In another area, he said the figures showed that of the revenues reported by hardware manufacturing companies reporting revenues of over \$5 million the IBM share had also declined. In this category, he said the firm had a 67.7% share in 1952 and only a 44.9% share in 1970.

## A First: IBM Gives Defense

(Continued from Page 1)

The judge noted that dismissal of cases could be the correct course of action in some antitrust cases, but said this particular one was too complex to be dismissed before he had heard all the evidence.

He also noted that IBM had specifically requested that its counterclaim against Telex for theft of trade secrets be heard with the Telex case against IBM and indicated he had not yet heard any evidence on this matter.

make all the motors for their own cars.

"Ridiculous as this analysis may appear," Barr said, "it is the necessary outcome of accepting Telex's position. Telex itself analogized the memory of a CPU with an engine in a car . . . yet Telex is claiming that IBM is monopolizing the market for EDP equipment when it is used with IBM central processing units."

"The Supreme Court in 'cellophane' disposed of such a radical theory of market definition. This court should do likewise."

## 'Slight Changes'

In addition, Barr said the Telex case also shows that equipment used with IBM equipment can also be used with the mainframes of other manufacturers with only slight changes and that therefore it is not equipment made solely for the IBM market as Telex claims.

"Particularly where, as here, Telex has had ample opportunity to place before the court an enormous quantity of documents and many witnesses, this court should dismiss for Telex's failure to prove a market," under rule 41 (B) of the Federal Code, Barr said.

In conclusion, Barr said "the market theory advanced by Telex has no support in the law and is contradicted by the proof in its case . . . equally important, the proof concerning the way Telex markets its own EDP equipment and the proof showing how others market similar equipment, disproves any claim that a 'market' exists for that equipment when attached to IBM CPUs."

"For these reasons, Telex's antitrust claims should be dismissed," Barr concluded.

ATTACH LABEL HERE for address change or inquiry. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels: Please let us know four weeks before you plan to move. List new address below and include a current mailing label or your old address.

☐ 1 year — \$9\*

\*\$10 a year in Canada; all other Foreign, \$25 a year.

## CHECK HERE TO ENTER YOUR SUBSCRIPTION

☐ Charge My American Express Account:

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

☐ New subscription

If charge we must have cardholder's signature: ☐ Change of address

## PLEASE CIRCLE 1 NUMBER IN EACH CATEGORY

### YOUR INDUSTRY

- 01 Mining/Construction/Oil & Refin.
- 02 Manufacturing — Computer or data system hardware/peripherals/ other associated mechanical devices
- 03 Manufacturing (other)
- 04 Utilities/Comm Sys/Transport
- 05 Wholesale/Retail
- 06 Finance/Insurance/Real Estate
- 07 DP Serv. Bureaus/Software/Plann.
- 08 Business Services (except DP)
- 09 Education/Medical/Legal
- 10 Federal, State and Local Govt.
- 12 Communications/Printing/Publ.
- 13 Other:

### YOUR FUNCTION

- 01 Corporate Officer
- 02 Data Processing & other Operational Mgmt
- 03 Data Processing Professional Staff
- 04 Consultant
- 05 Lawyer/Accountant
- 06 Engineering-Management/Scientific/R&D
- 07 Sales/Marketing/Account Exec
- 08 Librarian/Educator/Student
- 09 Other:

|                  |                |         |  |  |  |  |  |  |  |       |          |  |
|------------------|----------------|---------|--|--|--|--|--|--|--|-------|----------|--|
| First Initial    | Middle Initial | Surname |  |  |  |  |  |  |  |       |          |  |
| Your Title       |                |         |  |  |  |  |  |  |  |       |          |  |
| Company Name     |                |         |  |  |  |  |  |  |  |       |          |  |
| Send to: Address |                |         |  |  |  |  |  |  |  |       |          |  |
| City             |                |         |  |  |  |  |  |  |  | State | Zip Code |  |

Address shown is: ☐ Business ☐ Home ☐ Check here if you do not want to receive promotional mail from Computerworld.

**COMPUTERWORLD** Circulation Department  
797 Washington St., Newton, Mass. 02160

## At Senate Monopoly Hearings

# CIA Head Says Small Firms the Innovators, Not IBM

By E. Drake Lundell Jr.

CW Washington Bureau

WASHINGTON, D.C. — Computer Industry Association President Dan McGurk told Senate investigators last week that most of the innovations in the computer industry came from the smaller firms in the business and not from the dominant firm.

At the second round of hearings on Sen. Philip Hart's bill to break up concentrated industries, McGurk said, "I suspect that most Americans are not aware of the skill and entrepreneurial drive of these small organizations which have introduced major fundamental technical innovations to the computer industry."

It is because of the smaller organizations, he said, that "we have greater capacity and lower cost in data processing."

"It hasn't taken massive concentrations of capital [to design these innovations]. It has required no federal subsidies... but to properly exploit these innovations does require large sums of capital," he added.

The Hart bill singles out the computer industry as one of the five most concentrated industries in the U.S. today. It would call for the restructuring of an industry when the top four companies controlled over 50% of the market or when any one company got over 15% of the industry's revenue in a year.

The bill would also set up a special court to hear cases under the act and to reorganize the industries identified as concentrated.

In his testimony, McGurk noted "the enormous dominance of IBM in business accounting machines has carried over into a comparable dominance of the business computer industry. As a result of this dominance, enterprising and innovative companies have often found a ceiling on their size of around 2% of the applicable market, or have been acquired by larger companies."

"By its control of the marketplace — not by superior technical or productive

skill — the dominant firm in this industry has been able to make strong competitive countermeasures to any company that begins to threaten its installed base of products," he said.

### Help or Hurt?

He also indicated that the argument that IBM helped substantially to reduce our balance of payments problems was open to some question because it had almost as much of its production overseas as in the U.S. The smaller firms, on the other hand, have a higher percentage of revenue producing exports because they cannot afford to manufacture overseas, he added.

Overall McGurk said there is no question "that a reduction in concentration in the computer industry... is technically feasible."

But at the same time he said the industry should not come under government regulations, but rather it should be en-

couraged to deconcentrate on its own.

One method to accomplish this would be to impose a graduated income tax on corporations in concentrated industries, he indicated, which would give the top management in companies that dominate an incentive to decentralize.

"One of the problems with our current antitrust activities is proof of monopoly takes an inordinate amount of time, and at this point in our history such time is not available," he said.

### Judge Explains Problems

Judge Philip Neville, the judge in charge of the IBM-Control Data antitrust suit, supported this feeling on the lack of time in his testimony on the problems of managing a large antitrust suit such as the IBM-CDC case.

At a certain point in antitrust cases a judge has to take control or else the

company with the most resources will wear the other one down, he said.

Neville told the Senate group the settlement of the case out of court was "most welcome," even though he had spent four years on the pretrial phases of the case.

He indicated it would have been hard to find a jury to sit through the trial, which was estimated to have about a year's worth of testimony.

He said, during the discovery procedures in the case, IBM had microfilmed or copied around 80 million Control Data documents and Control Data had sent 61 people to IBM headquarters to copy about 40 million IBM documents.

He also noted the deposition process — where attorneys from one firm question the employees of the other or its potential witnesses — was a time-consuming one and said that in some cases as much as 15 days was taken in getting a single deposition.

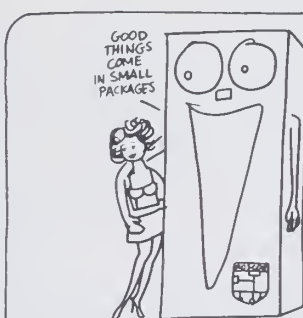
## Did You Know?

One of a series MAKING IBM INSTALLATIONS WORK BETTER

### ADR's ROSCOE lets you program on-line at lower cost than IBM's TSO.



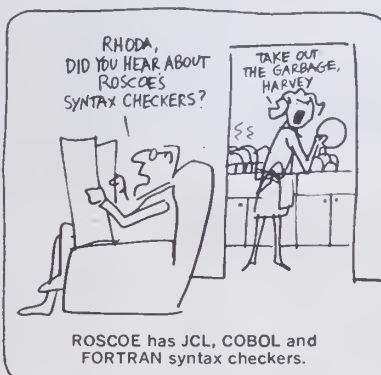
ROSCOE is for conversational on-line programming.



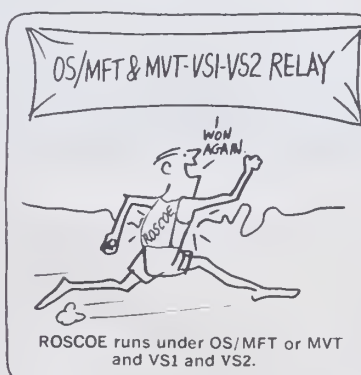
ROSCOE'S core and disk requirements are modest.



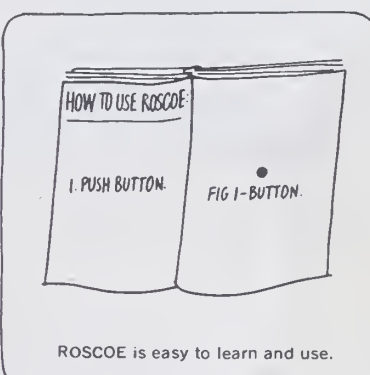
ROSCOE offers generalized terminal prompting facilities.



ROSCOE has JCL, COBOL and FORTRAN syntax checkers.



ROSCOE runs under OS/MFT or MVT and VSI and VS2.



ROSCOE is easy to learn and use.

ADR's ROSCOE is your Declaration of Independence from IBM's TSO. By the time you pay for all the TSO facilities you need, ROSCOE will cost you less. In both direct and indirect costs. And ROSCOE does not degrade batch throughput.

ROSCOE can generate JCL, submit jobs, retrieve output and support most kinds of typewriter and display stations. ROSCOE's fully field-tested. And proven in use. In operation for over two years at 360/370 sites in the United States, Canada and Europe. Find out how you can benefit. Just mail us the attached coupon, or contact one of the ADR offices below.



**APPLIED DATA RESEARCH** THE SOFTWARE BUILDERS®

ADR software products: in use at over 2,500 installations worldwide.

APPLIED DATA RESEARCH, INC.  
SOFTWARE PRODUCTS DIVISION  
Route 208 Center, Princeton, New Jersey 08540  
Telephone (609) 921-8550

Yes, I'd like to know more about ROSCOE

Name \_\_\_\_\_

Company \_\_\_\_\_ Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_

Computer Configuration \_\_\_\_\_

I am also interested in

- ☐ AUTOFLOW\* for maintenance and debugging
- ☐ The LIBRARIAN\* for security and protection
- ☐ MetaCOBOL\* for increased productivity
- ☐ SAM for planning
- ☐ PI SORT for faster sorting

U.S. offices in Atlanta, Boston, Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, Pittsburgh, Princeton, St. Louis, Washington, D.C.

Representatives in Australia, Austria, Belgium, Brazil, Canada, Denmark, England, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Puerto Rico, South Africa, Spain, Sweden, Switzerland, Taiwan, West Germany.

## Suit Charges IBM Partly Responsible For Equity Fraud

(Continued from Page 1)

equipment."

IBM is accused in the suit of "carelessly, negligently and wantonly" selling, leasing, programming and renting computer and data processing equipment without any means of safeguarding the public."

This was done, it said, "although defendants know, or should have known that the equipment could be and has been used to defraud the public."

The suit also claims IBM and its affiliates, even though "aware of the danger to the general public, deliberately neglected for business reasons to caution certain customers and the unknowing public of the danger of potentially undetectable fraud being perpetrated through the means of such computer and data processing equipment."

The suit said IBM and its affiliates were aware that without such general warnings the public would depend on the "integrity and accuracy" of computers when dealing with financial statements of companies using them.

The fraud, the suit said, couldn't have been possible without the failure of IBM to design mechanical and procedural means of detecting fraudulent inputs into equipment and failing to safeguard the public in the marketing of the equipment.

The suit seeks over \$2 billion in general damages and \$2 billion in punitive damages.

In addition, it seeks over \$1 million from IBM for the money paid by Equity Funding to IBM to lease the equipment.

# CALL FREE 800-453-5323

No matter what business you're in or where you are in the continental United States, a toll-free phone call will bring you complete information about our fast-selling data communication terminal, the UNIVAC® DCT-500.

UNIVAC DCT-500 Data Communication Terminal

**SPERRY UNIVAC**  
Only when our customers succeed do we succeed.



## Don't gamble with computer leasing

Planning to order a System 370? Have you found that when you choose the flexibility of monthly rentals, you risk breaking your budget with hardware costs? Or, when you try to save on hardware costs, are you asked to accept a long-term arrangement you might regret in the future?

Ford Credit takes the gamble out of computer leasing. You may choose a System 370 operating lease that provides up to 25% savings for three years on the manufacturer's monthly charge, without a termination penalty or residual guarantee at the end of the term. Beginning in the fourth year, you can select options that offer savings of up to 40%, and you retain the right to terminate your lease.

Flexibility, Savings, Up-grading, and all the Stability of the Ford Credit name. Our lease can be the ace in your hand.

Write: Ford Motor Credit Company, Commercial, Industrial and Real Estate Financing, P. O. Box 1729 (KM), Dearborn, Michigan 48121.  
Telephone: (313) 323-4547 or 323-3487.

Commercial  
Industrial  
Real Estate

FINANCING

Ford Motor  
Credit  
Company



## Passive Entry 'Good Way' To Obtain Sensitive Data

NEWPORT, R.I. — Passive intrusion into an operating system is a "good method" for a criminal to obtain sensitive or otherwise valuable information, according to Cmdr. Jan Prokop, director of the Navy's computer selection office.

The three main methods defined by Prokop at a Navy seminar as "passive intrusion" include electromagnetic pickup (by radiation of signals), wiretapping and hidden transmitters.

To allay any suspicion that he was suggesting only possible, rather than actual methods of intruding into a computer, Prokop gave specific examples of two of these methods.

Regarding radiation from a computer, he said he had supervised a programmer who had a transistor radio in a working space several floors away from the main computer. Nobody knew why the programmer was always first to ask for test-time when the system was idle, until it became known that the programmer could tell, by the static on the radio, when the printer stopped.

Prokop claimed it would be a simple matter to decode the static and obtain copies of whatever messages were being printed. He also suggested this method of eavesdropping was effective for CPUs,

other peripherals and communications lines.

He also cited a test case in the Pentagon where a CRT was being read by radiation signals by an unauthorized user several rooms away from the computer.

Prokop also claimed "hidden wireless transmitters had been found inside a CPU at a security agency. These could transmit information to a truck with electronic receiving equipment," he noted.

## Modeling Know-How Can Aid Management

NEWPORT, R.I. — "We know enough about modeling to aid in management," although computer hardware currently may be inadequate, according to Harvey J. McMains, director of corporate planning at AT&T.

One prime use of models would be depreciation, wherein a computer model can provide management with a better, deeper understanding of this financial reality, McMains noted.

Another area is "our pool of funds," he said. Financial modeling in this area can be likened to the "theory of dams," McMains said, adding cash flows into a "reservoir." In the case of AT&T, the outflow is \$200 million a day, he added.

Optimizing I/O is incompatible with modeling, which is "multidimensional," he stated.

McMains told attendees at a Navy computer user-group seminar here that "present management is not equipped to deal with machine modeling," which is really performed for "strategic support."

**For Lease**  
**Teletype\***  
**Model 33ASR**  
**with tape**  
**perforator**  
**and reader—**  
**\$53 per month.**

**Model 33KSR**  
**send/receive—**  
**\$39 per month.**

**Available in any quantity**  
**for immediate delivery—**  
**includes nationwide**  
**maintenance service.**

Call or write:

RCA Service Company  
A Division of RCA  
Technical Products Service  
Bldg. 204-2, Camden, N.J. 08101  
Phone (609) 779-4129

\*Registered trademark of Teletype Corp.

**RCA**

## No Installation '100% Secure'

(Continued from Page 1)

now being sought, she said, a guideline "in the next calendar year would be a major breakthrough."

She agreed with Prokop that a major problem facing users today is an "increased capacity for computer crime," particularly since there is also an increasing demand for real-time processing in the public services sector of computer usage.

"This is a service economy," she remarked, acknowledging an increasing public demand for accountability in this service environment.

### Protecting Operating Systems

Another "big issue left" is that of securing operating systems. Prokop examined two routine manners of "active intrusion" into a system, and three specific areas where operating systems can be breached by "sophisticated" approaches.

"Browsing" and "masquerading" represent the least sophisticated approaches, he noted. The first occurs when a user accidentally discovers another user's password, while the second is an intentional unauthorized access with an illegal password.

Prokop described three other methods:

- "Using trap doors," little places in the operating system where "cracks appear in the cement," such as uncleaned NO-OP instructions.

- "Between-the-lines entry" in a communications environment. This occurs, Prokop said, when one user gets on the system, and the second user (the perpetrator) awaits the opening of files, then transfers the files of the rightful owner to a disk or other storage. The computer, Prokop claimed, "can't tell" the difference between the two users. After storage, the files are printed when the first user has a signedoff.

- "Piggy-back entry." This is accomplished by actually cutting the communication lines and connecting a mini-computer between the rightful user and the computer. When the authorized user calls the computer, the minicomputer answers, while the perpetrator uses the mini to relay his own messages to the computer system.

The mini, in effect, is distracting the authorized user, possibly to the extent that he gets frustrated and "signs off," never realizing a "conversational rapport" is still going on between the perpetrator and the computer, Prokop said.

## You've Come a Long Way

NEWPORT, R.I. — Operating systems have come a long way, according to Prof. John Donovan of MIT. At a Navy seminar he cited some specific examples of recent progress in operating systems:

- OS/360 took 2,000 man-years to build.
- TSS took 500 man-years.
- Multics took 50 man-years.

While IBM's TSS was developed in assembly language, Donovan said, Multics, developed at MIT, represents the "operating system of the future," in that it was developed in a high-level language.

Donovan also recalled that a graduate student was assigned to write an operating system similar to IBM's OSMVT/360, and it took the student one-and-a-half months to complete the task.

"This is in the advance level of understanding" which has taken place, he related. Donovan also predicted that the high-level language for operating systems would not be Cobol.

"We now know users are demanding different classes of storage," he said, as well as other conditions that exist in such languages as Algol/68 or PL/I.

## COMPANY WANTED

Long established, profitable, multinational research and consulting firm desires to acquire all or part of company having following characteristics:

- Heavily engaged in software sales
- A well managed sales team of at least five persons

Purpose of association is to expand our software sales force with an experienced group and enlarge the highly successful product line and its geographical coverage.

Reply in confidence, with financials, product descriptions, and description of sales force to:

Box 3856  
60 Austin Street  
Newton, Mass. 02160

## JOIN THE LEADER

### IN SYSTEMS & PROGRAMMING

TSI's Project Services Division has a continuing need for expert personnel to support its expanding business in the custom design & implementation of computer-based information systems for manufacturing and distribution clients. Our specific requirement is for personnel with a solid technical background (at least 2 years COBOL, BAL; exposure to file design concepts) and the desire to do it all — including design, specification, programming, testing and implementation.

If your job objectives include:

- continuing challenge and advancement in the application of sophisticated data processing techniques;
- personal participation in systems design, specification and implementation;
- contribution to the overall performance of a highly professional peer group;
- participation in the continuing, exciting growth of a young and successful firm;
- contact with the user from system conception through system maturity;

then we invite you to consider these positions:

### Senior Systems Analyst

Analysis, design and implementation management. Work with client management in evaluating, recommending and installing advanced systems for order entry, forecasting, inventory control, production planning, shop scheduling and loading. Manage TSI and client analysts and programmers. Provide technical and application expertise in projects throughout the manufacturing and distribution industries. This is a "working manager's" position.

### Systems Analyst

Provide analysis, design and occasionally programming support to TSI systems development projects, especially in telecommunications and data base design. Experience in complex system design and implementation, preferably in manufacturing or distribution, will be helpful. A continuing growth environment requiring self-reliance as well as technical competence.

### Programmer Analyst

Detailed design, programming, testing and documentation of computer programs in support of advanced information systems. Opportunity for personal development in a challenging and sophisticated environment working with project clients. Significant individual responsibility within given projects, primarily in manufacturing and distribution applications.

For these positions, please send resume including educational & salary history to J.K. Burgess, Administration Manager.

### IN TELECOMMUNICATIONS SOFTWARE

TSI's Software Products division markets TASK/MASTER®, a telecommunications monitor which has rapidly become the leading independent software system to support on-line applications. TASK/MASTER's powerful facilities and ease-of-use have helped open markets for TSI throughout the United States, Canada and Europe. New development related to TASK/MASTER is rapidly opening additional markets in specialized application areas, data base systems and extended telecommunications support.

The following positions, each of which requires a strong technical history (including some assembler language programming) and a willingness to travel, are currently open in this dramatically growing organization.

### Marketing

Technical sales of TASK/MASTER and related software. On-site presentations to prospective users plus geographically-scheduled seminars. A tremendous growth opportunity for the technically-competent individual with an ability to communicate well. Incentive based compensation. Earnings in first year expected to be \$18-30,000 plus excellent benefits. Write to Dennis G. Sisco, Marketing Manager.

### Customer Service

Each Customer Service Representative manages the successful implementation of TASK/MASTER and related software in 10-12 new accounts each year. Duties include formal education of user personnel, supervision of system implementation, on-site application consultation, development of specialized support to meet unique customer requirements and followup customer support services. Total flexibility, high responsibility, excellent compensation. Write to Joseph W. Farrelly, Manager of Customer Service.

### Product Development

Design and develop extensions and enhancements to TSI's exciting on-line systems. Work with data base systems, new terminal devices, VS., VTAM and advanced on-line applications. Compensation commensurate with demonstrated competence and creativity. Write to Ernest K. Keet, Vice President, Software Products.



**turnkey systems inc.**

one eleven east avenue, norwalk, connecticut 06851

TSI is an equal opportunity employer.

## IBM 370's

installed or on order.

Talk with CSA, a computer leasing company prepared to show you the way to greater prime and extra shift savings, all with the extra advantage of investment tax credit directly or in the form of a lower rate.

For further information, please call: (617) 482-4671

**Computer Systems  
of America, Inc.**

a computer equipment leasing company.  
79 Milk Street Boston, Mass. 02109

Send for the 12 questions you should ask of any leasing company before you lease

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
370 on order \_\_\_\_\_ installed \_\_\_\_\_  
Model \_\_\_\_\_ Date \_\_\_\_\_

## Bill Seeks to Control Texas' DP Acquisitions

AUSTIN, Texas — A bill that would tighten controls over the purchase and rental of data processing equipment by state agencies has been submitted to the State Senate here and approved for floor debate.

The bill would require approval by the governor's office and the state auditor for the purchase or lease of computers and related equipment by state agencies.

Sen. William N. Patman, sponsor of the bill, said the costs of DP equipment purchased by the state have skyrocketed from \$1.5 million in 1964 to \$8.3 million in 1973. In addition, the state owns over \$20 million worth of DP equipment.

"Presently there is no general statute that governs specifically the procedures involved in the acquisition of computers and computer-related equipment and services by state-supported agencies and institutions," Patman said.

### Educom to Study Trends In Centralized Computing

PRINCETON, N.J. — The Exxon Education Foundation has awarded \$66,000 to the Interuniversity Communications Council, Inc. (Educom) to study the ways in which state agencies have centralized computing services for institutions of higher education and the extent of the trend toward centralization.

"This project will encourage the sharing of information among state agencies and will provide an evaluation of the impact of statewide consolidation and networking on the future of computing in higher education and on the relationship between educational and governmental agencies," said Henry Chauncey, president of Educom.

The study will begin with a survey of developments in all the states to identify the most significant developments. Representatives of the most promising systems will then be brought together to exchange views in a working conference scheduled for the fall of 1973. Results of the study will be published in a report to be distributed to educational institutions and governmental agencies.

tributed to educational institutions and governmental agencies.

### Grading System 'Fails' But Only Temporarily

CENTRALIA, Wash. — An otherwise smoothly running computerized school grading system was recently held up for

## News Wrapup

two weeks due to a bus company error.

Computer printouts of the student grade reports for W.F. West High School were mistakenly shipped to The Dalles School in Oregon when students at The Dalles were on spring vacation, according to Larry Norwood, principal of W.F. West.

While the reports sat in an Oregon bus depot waiting for school to resume at The Dalles, Norwood ordered another set of grades from Computer Systems, Inc.

The second set arrived quickly but when

Norwood opened it he discovered the grades for deportment were in the academic achievement column, the effort grades were in the deportment column and the achievement grades were in the effort column.

Another set was ordered and two days later it arrived along with the first set which had been returned by The Dalles.

### DP Decides Summer Jobs

LOUISVILLE, Ky. — How would you like to have a computer decide whether or not you got the job? That's what's happening to 840 sons and daughters of General Electric employees here.

GE's employment office put the names of the summer job applicants into a computer and had it pick them out one by one in random order.

Is it fair? This year's number one choice was 902 on the list last year and didn't get on at GE. And this year's number 840, last on the list, was number 165 a year ago and got a GE job.

### Legislator Finds 'May' Most Distressing

MADISON, Wis. — "May Day" has never been a more appropriate distress signal than in the case of State Rep. Edward Jackamonis.

Jackamonis has asked the Legislative Reference Bureau to draft a bill altering the state's spring election laws, which would entail the use of the month name May.

Wisconsin has a system under which computers scan the statute books to locate designated words and phrases, ensuring that all sections affected by a new law will be changed.

The computer dutifully scanned the books, but, unfortunately for Jackamonis, did not discriminate between the proper noun May and the verb may. The result was a voluminous printout listing 22,721 references to "M(m)ay," but with no indication as to whether it was an "m" or an "M."

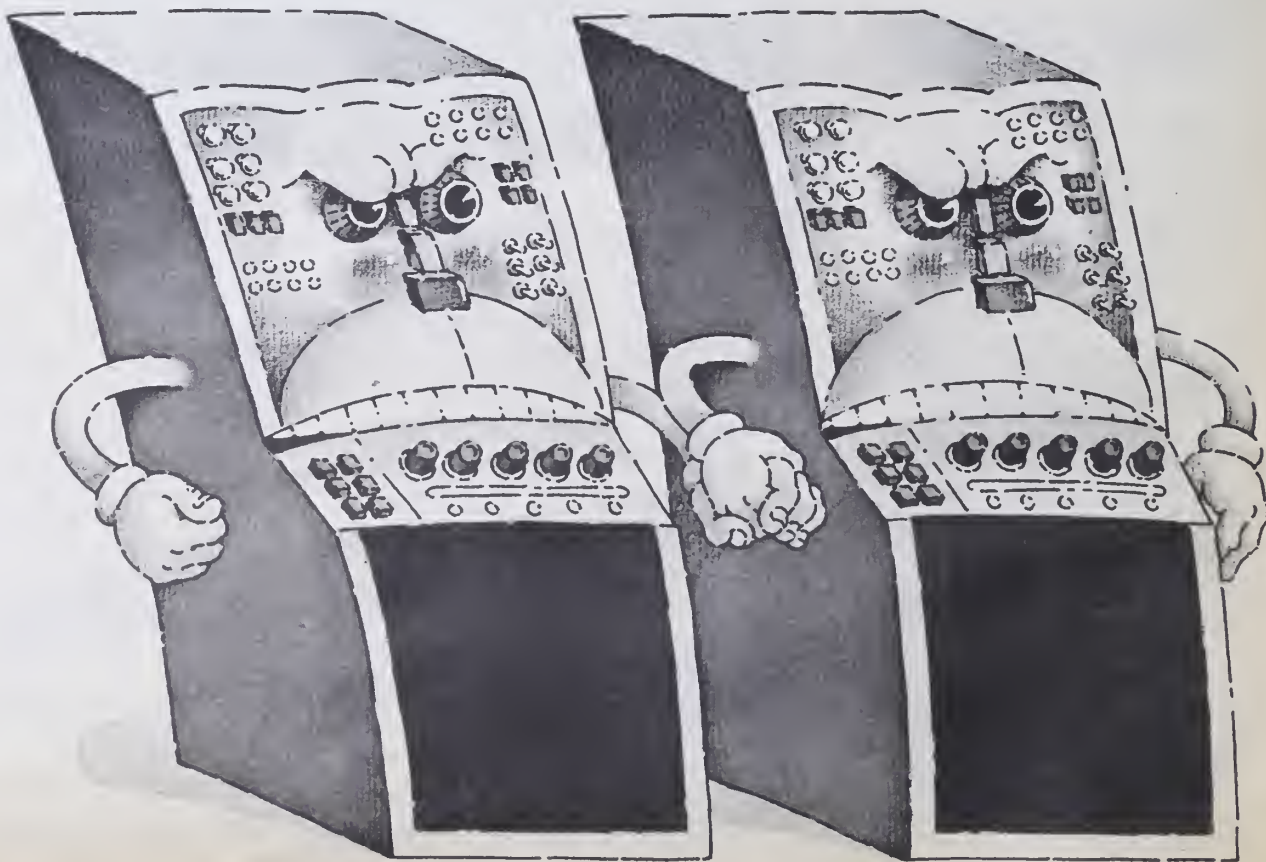
# Introducing "Scrooge-2"

## A new money-saving arrangement for remote computing.

Perhaps the biggest challenge in computer operations management today is obtaining a time-sharing-like response with batch-like costs.

Grumman Data Systems has just risen to the challenge.

We have constructed an intra-active system consisting of a 360/67 for time-sharing that is hard-wired (and soft-linked) to a fast-response 360/75



## STILL WAITING?



WE'LL SHIP YOU A CDI TELETERM® IN 7 DAYS\*

OR ELSE.

Get a CDI Model 1030 TELETERM portable time-sharing terminal by next week. Just send us a bona fide purchase order for \$3,100. If we take longer than 7 days to get your TELETERM on its way, we'll give you a whole case of paper. Free.

The CDI 1030 is a lightweight, quiet, reliable terminal using a thermal printing technique. It operates at 10, 15 or 30-characters per second and is perfect for time-sharers on the go.

So don't just sit there and wait. See how fast you can get a TELETERM of your very own!

\*A.R.O.

a TECHVEN corporate partner



COMPUTER DEVICES INC.

9 Ray Avenue

Burlington, Mass. 01803

(617) 273-1550

Reg U.S. Pat. Off.

## Five-Year Study Finds

# Simple Signal Control Enough to Keep Traffic Moving

By Joseph Hanlon

Special to Computerworld

GLASGOW, Scotland — Controlling traffic signals with complex software and large computers is a mistake. Small computers and simple software do at least as well, and often better.

This surprising conclusion comes from five years of research by the Transport and Road Research Laboratory (TRRL) here comparing different forms of signal control.

The simplest computer control, with the same signal timings every day, moves traffic faster than complex "demand responsive" systems that change timings in response to actual traffic. The reason, TRRL said, is that a predetermined set of timings can be optimized for an entire network of signals, while a demand responsive system optimizes each intersection separately. In the latter type of system, time gained at one intersection

can be lost at the next.

In any computer-controlled signal system, all of the traffic signals are connected to a central computer, which tells the signals when to change. The question is how the computer decides when signals should change, TRRL explained.

In the simplest form, the computer uses the same set of instructions every day. This schedule is stored in memory, and a digital computer is required for only two purposes: keeping track of timings and monitoring traffic signals to see that they function correctly.

### Five Timings

The schedule of timings, however, is determined by the use of a large computer model which takes into account the normal traffic flows at each intersection. Usually there are five basic timings: morning peak, mid-day, afternoon peak, evening and night.

Using TRRL's Transyt to set the timings, this relatively simple form of computerized signaling cut average journey time here by 16% and in West London by 9%, the research group said.

### Consider Variations

Such a system, however, assumes that traffic is approximately the same every day, and does not take into account random variations in traffic during the day. By installing traffic sensing devices at each intersection and using a large central computer, it is possible to change the timings to suit the traffic.

TRRL tested this "demand responsive" technique, which uses a basic predetermined timetable and modifies it somewhat to suit traffic. Surprisingly, it produced no additional benefit despite the extra cost, according to J.A. Hillier, TRRL head of traffic engineering.

Next TRRL tried "a complex, fully

responsive control strategy known as Plident," Hillier said. It increased journey time by 29% and "brought the traffic in parts of central Glasgow to a complete standstill."

The Glasgow experience is supported by tests elsewhere. In Madrid, for example, a Transyt-optimized fixed-time system decreased average journey time by 9% over a demand response system already in use, the laboratory said.

### Big Computers Unnecessary

Traffic experts here argue that big computers are unnecessary for signal systems. They believe a DEC PDP-11 or a small, process control computer such as a Honeywell 316 is adequate.

In Glasgow, for example, TRRL installed a large Marconi Myriad 1 because it planned a wide variety of tests. Now this city finds it can control signals at 80 intersections with only 5% of the machine's time, the researchers said.

There seem to be two reasons why the simpler systems work best. As one expert commented: "An adaptable system like Madrid's ties itself in knots trying to keep up with the traffic, while a fixed time plan fits the traffic to the signals but gets it through faster."

The second factor is that traffic is surprisingly predictable and consistent. Even bad weather or an early closing day does little to change city-center traffic, so that the data used to optimize the fixed time system is almost always correct, traffic experts said.

Hillier also stressed that low-level computerization is highly profitable. The Glasgow system cost \$850,000 to install, yet the journey time saved is calculated to be worth \$1.2 million each year.

batch processing machine. We have formally designated this service as TS/RJE. Informally, we call it "Scrooge-2," for the way it carefully squeezes every dime you give it.

In Scrooge, the most comprehensive operating system, OS, can be automatically used for execution of batch programs that were developed under the language-compatible CP/CMS time-sharing system.

Its prime benefit is running work in the batch environment which you would normally run in the time-sharing environment. In the past, it has been too much trouble to remove it from the time-sharing machine. By using Scrooge, you'll release your time-sharing equipment for more appropriate time-sharing work, yet get appropriately fast turnaround times on the batch work.

Not only does our new system pinch dollars but it lets you pinch them in four different ways as the chart indicates.

In addition, there is provision for information flow back and forth between machines, to and from batch terminals as well as interactive types. You can query status and/or cancel batch work. A powerful skeleton processor minimizes the OS job deck that must be stored in an on-line file.

We can plug you into Scrooge right away, but you'll probably want some details first. Call or write Curt DeForest, Manager-Computer Services, Grumman Data Systems, Department 260, Bethpage, New York 11714.

### Different ways to save with Scrooge-2.

- (1) You can use our complete TS/RJE system from a remote terminal... entering both time-sharing and batch work. Because of the high cost-effectiveness of the system, your data processing costs should show a substantial saving.
- (2) You can hook up your own time-sharing 360 to our batch 360/75. Your data processing costs should drop sharply, as you now enter each job into the most appropriate environment.
- (3) You can hook up your own batch-processing 360 to our time-sharing 360/67. You'll get time-sharing response on these priority development jobs, while maintaining a cost-effective operational level.
- (4) You can use Scrooge for program development, getting as much as a four-to-one reduction in program development cost.

## Grumman Data Systems

Computer services and equipment that lower the cost of computing.

## Computers Take the Bite Out of Dental Implants

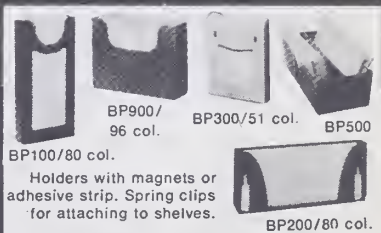
LOS ANGELES — Computer techniques to improve the design of dental implants as replacements for missing teeth are being developed through a cooperative research program of the University of Southern California's School of Dentistry and Caltech's Jet Propulsion Laboratory, Pasadena.

Preliminary computer models have been developed for evaluating the function of dental implants under normal chewing action. These models will allow researchers to study the stresses and strains set up in each tooth — or its implant replacement — and the jawbone, and to investigate different kinds of implant materials.

The goal of the joint project is to design implants that function as efficiently and safely as natural teeth.

## Tabcard Holders

For 80 col. — 51 col. — System 3 (96 col.)  
RACKS • TRAYS • ACCESSORIES



Holders with magnets or adhesive strip. Spring clips for attaching to shelves.

Vinyl envelopes available with adhesive back or magnets. Special sizes made to fit your needs.

Racks made with any holder in any design or size.

OTHER STYLES AND SIZES AVAILABLE. WRITE FOR INFORMATION.

**BEE MAK PLASTICS**

7424 Santa Monica Blvd.  
Los Angeles, Cal. 90046, (213) 876-1770

## WE HELP IF YOU NEED FINANCING-MONEY

We are a N.Y. financial holding corp. that helps businesses get back on their feet. Call Mr. L. 261-4052.

## MOVING?

Please notify *Computerworld* at least four weeks in advance. When writing about your subscription, please enclose a recent mailing label. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels.

797 Washington Street  
Newton, Massachusetts 02160

COMPUTERS NEED  
**U.C.P.\***

\***UNINTERRUPTIBLE COMPUTER POWER**

SYSTEM 700UCP PROVIDES

- VOLTAGE CONTROL
- FREQUENCY CONTROL
- TRANSIENT CONTROL
- LINE ISOLATION
- BRIDGES UTILITY POWER INTERRUPTIONS



Get the facts on  
**UNINTERRUPTIBLE COMPUTER POWER**

Call Frank Wood (703) 355-2803

OR WRITE

**POWER SYSTEMS & CONTROLS, INC.**

P O BOX 27306 • RICHMOND, VIRGINIA 23261



## Computer Week III: 'Working Together'

BUFFALO, N.Y. — "Working together to promote better understanding of data processing within our community" is the theme of Computer Week III, a five-day program of DP-oriented activities sponsored by a group of professional organizations here.

The events, planned for May

21-25 at the Hotel Statler, will be open free of charge to computer professionals, users and the general public. About 25 to 30 vendors will be exhibiting and there will be some special displays for non-DPer to help them become acquainted with computers and data processing.

There will be educational semi-

nars throughout the week on topics which include minicomputer applications, educational uses of computers, systems design, privacy and security and program language selection.

One of the sponsors of the

### Societies/User Groups

show is a group of local high school students — the Student Cybernetic Laboratory (Scyl) — which will be demonstrating the use of on-line terminals.

The other sponsors of the program, besides Scyl, are the local chapters of the Data Processing Management Association (DPMA), Association for Systems Management (ASM), Association for Computing Machinery (ACM) and The Institute of Management Sciences (Tims).

## Information Technology Institute To Explore Management Problems

WASHINGTON, D.C. — An Institute of Information Technology and Management will be held May 22-24 at the American University to explore major problems and opportunities for managers in the use of information technology.

Among the questions to be discussed will be: "How is information technology affecting information systems?"; "How can information systems managers plan for and accommodate major changes in technology?"; and "Impact of information technology on political-legislative processes — implications for

management?"

A one-day workshop on design of management information systems will precede the institute on May 21.

Registration for the institute is \$250 and \$75 for the workshop. Further information is available from Lowell H. Hattery, Director of the Institute on Information Technology and Management, Ward Circle Building, The American University, 20016.

## ASM Seminar Features 8 Tracks

BOSTON — The thirteenth annual New England Systems Seminar, sponsored by the Bay State, Boston and Mayflower Chapters of the Association for Systems Management (ASM), will be held June 8 at Bentley College in Waltham, Mass.

The program is divided into eight tracks with individual sessions ranging from single lectures to all-day in-depth studies. Some of the tracks include "Input/Output," which will cover man-machine interface and systems design for COM; "Technical Applications," dealing with

minicomputer networks in retailing, and "Terminal-Oriented Systems," which will look at hardware and software components, and design, conversion and installation considerations.

Commander Grace Murray Hopper will conduct a session on "Futures in Hardware and Software."

Registration for the seminar is \$40. Further information is available from Arnold Canner, Registration Chairman, NESS, c/o New England Nuclear Corp., 575 Albany St., Boston, Mass. 02118.

## AIIE 25th Anniversary Conference Planned

CHICAGO — The American Institute of Industrial Engineers will be focusing on "NOW: 'New and Old Ways' of solving problems" at their 25th Anniversary Conference, May 23-25 at the Conrad Hilton Hotel here.

For further information contact Technical Services, AIIE, 25 Technology Park/Atlanta, Norcross, Ga., 30071.

# Next time a high-speed drive ruins that bargain tape you bought, here's a note for your wife:



**GRAHAM  
MAGNETICS**  
Graham, Texas 76046

## Computer Keeps Watch Over Governor's Mail

By Ken Shonk  
Of the CW Staff

COLUMBUS, Ohio — A computer watchdog has taken over the job of making sure that the appropriate person on the governor's staff or the appropriate state official sends a reply to over 2,000 letters a week Governor John J. Gilligan receives.

The watchdog system has made real progress in the two months of its existence in reaching the Governor's avowed goal of a more responsive government, Gilligan's press secretary, Robert Tenebaum, said. The amount of mail coming into the governor's office since the system became operational has tripled.

"When we were automating the mail handling system," said J. Tepper, Gilligan's executive assistant for administration, "we set up a system of routing codes for recording the subject matter, the opinions expressed, the origin, the official the letter was referred to, the writer and other information for each letter."

The coded information is then input to become part of the system's data base. When letters are answered, forms are returned to notify the computer. When letters aren't answered the computer sends a reminder to the official the letter was sent to for reply.

The system also has the ability to generate weekly status reports for the governor and to make management reports which break down the governor's mail according to any of a number of

classifications such as area, city, county, issues or opinions expressed.

"For instance," Tepper said, "the system could generate mailing labels for all the people who had ever expressed any opinion on environmental issues in the event the governor makes a policy statement on the issue or submits a bill to the legislature."

Tepper also stated the system is a timesaver when compared to the old manual system of mail handling. "The paperwork is actually less, and it's no problem for our large DP center to handle," he said.

### N.Y. Weighs Welfare Bill

ALBANY, N.Y. — Governor Nelson Rockefeller recently submitted legislation to have the state take over the administration of welfare and Medicaid programs now under local jurisdiction.

Rockefeller said state administration of these programs "would provide greater opportunity for systems applications, including computerized cross-checks, eligibility determinations and benefit calculations."

He said these functions would help reduce errors and would be necessary to meet stricter federal performance standards that will soon take effect.

The Department of Social Services, in anticipation of the bill's passage, has already retained three companies to develop the state system — IBM, Electronic Data Systems Corp. and Touche Ross & Co.

## We help Fruehauf Corp. make a fast buck.



"The Action Telecontroller communication processor manages our traffic in sales orders, inquiries, and financial and administrative data for our firm's 167 offices and plants coast-to-coast," says Denny Wallace, Director of Fruehauf's Management Information Systems Department.

"It does a faster, more accurate job than the system it replaced. It's not only saving us about \$4,500 per month, it gives us the ability to expand and grow with our company's changing needs," Wallace added.

If time is money in your business, take Action. Our telecontrollers are being used in public safety, distribution, transportation, brokerage operations and aerospace.

Once we tailor our mini-computer based communication processor to your operations,

we guarantee you this: a faster, more accurate, more reliable and less costly communications network than you have now.

Think about it. Then take Action—call us.

**action**  
COMMUNICATION SYSTEMS, INC.  
**ACS**

10300 N. Central Expressway / Suite 3131 / Dallas, Texas / (214) 691-1201

Sweetheart,  
Sorry, but I'm afraid I won't be able to take you and the kids to the lake this weekend.  
That bargain tape Jack bought got ripped to shreds, and we'll have to spend hours re-running the program.  
I told him I'd rather pay the extra for Epoch 4 out of my own pocket, just to have my weekends back.  
Try to understand,  
Love,  
Fred

## Editorials

### 'Harmful' Statistics?

AT&T has purposely attempted to prove that customer-provided data equipment is harmful to its telephone network. (see related story on page 19).

By finally responding to repeated FCC requests, Bell has come up with some extremely questionable statistics, implying that 30% of all non-Bell equipment causes harm to the network.

But the phone company has provided little conclusive evidence to support its claims. Instead it has relied on an unidentified description of a "typical" computer user, and unidentified photos of independent equipment that might cause harm because of supposedly bad wiring.

But users know the interconnection of non-Bell equipment often provides better performance at lower cost. And neither these users nor their independent equipment suppliers are out to harm the phone network.

AT&T should not be allowed to condemn customer-provided equipment with unsubstantiated claims. No doubt there will always be isolated cases to support any argument. But the FCC should demand that AT&T provide statistically significant data to prove the serious charges it has made.

### Who's the Protector?

Is it so hard for the public to understand that computers are only tools that at best can only be used to process data at great speed under the direction of human beings?

The suit filed in Los Angeles Superior Court by five investors of Equity Funding alleges that IBM must be the protector of the people. If we carry this uninformed and misguided logic to its just end, the next suit would be initiated against Bic International because someone used Bic pens to write up a list of fake insurance accounts.

The problem at Equity Funding, and indeed with most of the so-called computer frauds, is extremely simple. Auditors, in the traditional sense of the word, have been outpaced in their knowledge of accounting tools, what they can do and how they can be manipulated by almost anyone in a firm once people realize the auditors are no longer familiar with the tools of their trade.

In many business environments, it is impossible for the DP professional to realize his equipment is being used for an illegal purpose. We must all depend on the auditors.

And auditors, not manufacturer and DP professionals, must take the responsibility for protecting the people.

### Heads in the Sand

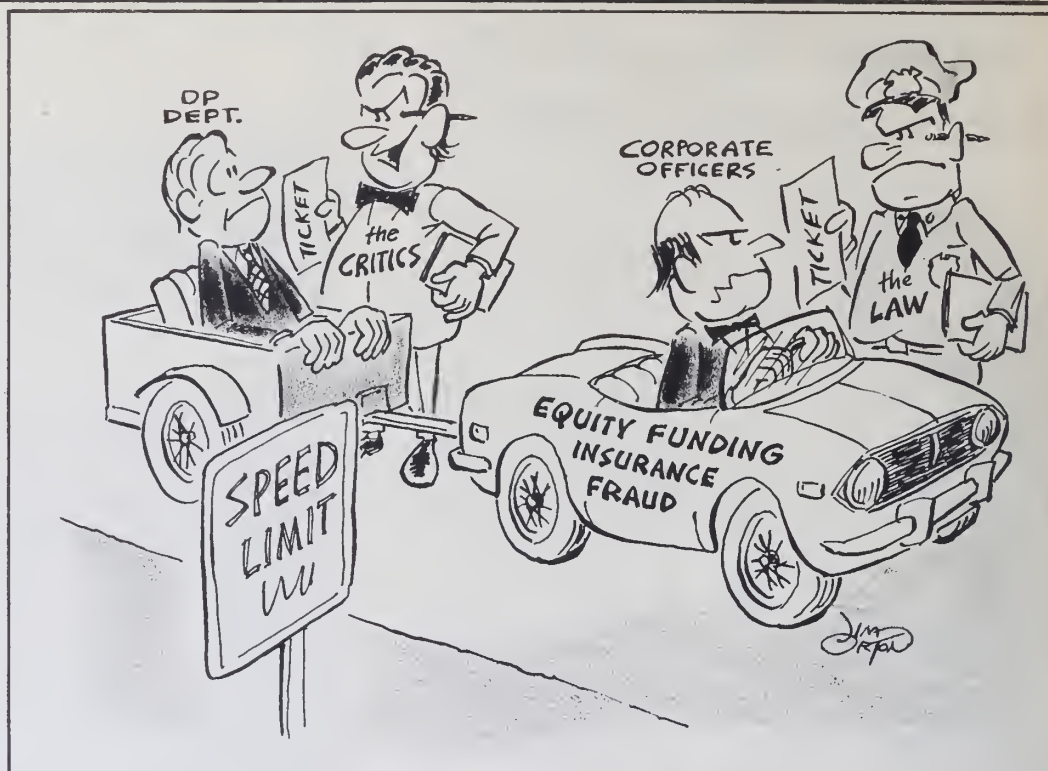
It is time election officials took their heads out of the sand regarding the security and accuracy of punched card and software-based ballot counting techniques.

In a recent survey of county election officers, an incredible 100% rated the security and accuracy of their systems as "good," indicating those topics were not high on their list of worries.

Perhaps it is lack of sophistication regarding the real dangers inherent in such systems on the part of these officials, or perhaps it is just that they have too easily accepted the claims made by the manufacturers of the systems, but it is clear that the systems may not be as accurate or secure as most officials think.

All election officials should take a closer look at their computer-based systems — a close look in which they will not be overawed by technical mumbo jumbo — to determine if they are really secure.

In cases where they clearly are not, the systems should not be used until ways can be found to ensure that they will be accurate and secure.



'Because You're a Passenger, That's Why!'

## Letters to the Editor

### A Word of Gratitude For Hearty Response

I would like to express my sincere appreciation to the many contributors to *Computerworld* in response to the editorial regarding my letter in the March 21 issue.

The many responses give me some encouragement that the question of an apostrophe or other similar figures in a name is interesting and of concern to many. I shall follow this issue closely and hope that many others will also.

I believe every response deserves my personal thanks and am taking this means of expressing my thanks to each and every one.

Robert M. D'Unger  
Arlington, Mass.

### And Still More Ideas: It's a Spelling Error

I have followed with interest the commentary and exchange regarding Robert D'Unger's complaints that he cannot get his name spelled correctly on computerized printouts.

There have been a number of fancy excuses why it can't be done. The fact is that it can be done; it is just that provisions were not made in advance to do it. It will cost money to change programs and/or upgrade equipment, but much of the correspondence avoids this point.

The real issue is that to spell D'Unger's name without an apostrophe is a spelling error.

An apostrophe, like all accent marks, indicates that something has been left out. It cannot be dropped. To do so changes the word.

For example, the words *round* and *'round* are pronounced the same. But the apostrophe makes them completely different words. Indeed, the words *won't* and *wont* are not only different words, but in this case, the apostrophe changes the pronunciation.

I defy anyone to tell me that dropping the apostrophe from a word will not change its mean-

ing. And no programmer has the right to change the information he or she is given before passing it along to the computer.

Margaret Dickinson  
Brighton, Mass.

### CDP Registrations May Be 30% Higher

In a recent article "ASM Explains Why It Left Foundation," [CW, March 28] it was reported that first-time registrations for the Certificate in Data Processing program had dropped from 2,233 in 1970 to around 1,430 this year.

The accurate figure for 1973 first-time registrations is 2,011, some 30% higher than the figure reported in *Computerworld*.

Your figures were obviously taken from an internal DPMA report prepared earlier in the year and was an early estimate.

Donn W. Sanford  
Executive Director

DPMA  
Park Ridge, Ill.

The 1,430 figure came from public documents issued in January 1973, not from internal ones. The use of the 2,011 figure in computing sales trends of the CDP (as was the context of the article) has certain technical problems, such as the admission in 1973 of CDP candidates without the same experience and the use of a 13-month year. Ed.

### CDP Shares DPMA Cost

In the article "Foundation Societies Urged to Pay DPMA \$2,500 Each for CDP Exam" [CW, April 4], it was stated that "during the 1969-1972 period, the losses from administering the CDP examination amounted to \$40,000." This is somewhat misleading although technically correct.

DPMA would have incurred most, if not all, of these costs even without the CDP program. Included in this figure, for example, is a prorated share of DPMA headquarters' utilities, taxes and salary allocations.

Donn W. Sanford  
Executive Director

DPMA  
Park Ridge, Ill.

### Officially Speaking...

I was quite amazed to read "ASM Explains Why It Left Foundation" — in the March 28 issue of *Computerworld*. Amazed, first, because this seemingly official ASM statement had a date-line of Chicago (not Cleveland), and, second, that the contents were incomplete and out-of-context statements that were contained in a confidential and personal response to one of our members.

I would think we would both be better served if statements concerning ASM were complete, meaningful and truly official. That can be very easily accomplished by addressing inquiries to our executive director, Richard Irwin, at our international headquarters in Cleveland, Ohio. We will do our best to respond and we'll guarantee the authenticity of the responses.

While we believe our research and recent history have led us to the correct decision involving the Computer Foundation, the main point is that jointly we can better help ourselves to serve the systems profession by a more direct and official reporting of ASM's positions.

Harry Ritson  
International President  
Association for Systems  
Management  
Cleveland, Ohio

It is difficult for *Computerworld* to disregard documents passed on to us especially when, as in this case, "confidential and personal response" was contained in a letter sent to three people from President Ritson himself on association letterhead. Ed.

### 'Moving' Grand Rapids

Re: "Time and Motion Studies Get Moving" [CW, April 25], ACTS Computing Corp. is in Grand Rapids, Mich., not Grand Rapids, Iowa.

Philip L. Glazier  
Vice-President  
ACTS Computing Corp.  
Southfield, Mich.

(Other letters and viewpoints on Pages 11, 12, 13 and 14.)

## Before Real Crisis Develops

# DPers Must Design Set of Professional Practices

Any profession, including data processing, generally finds out its true technical needs in a time of crisis. The court system, with its elaborate built-in safeguards for judge and prisoner alike, was not designed when everybody thought the judges could always be trusted.

It was designed so the system would work reasonably well even though judges cannot always be trusted.

And the principles and procedures involved in protecting everyone against dishonest judges now form a key part of the judicial system.

The medical profession also had its crisis and had to learn to live with it. The doctors' crisis came when people they treated died, particularly when they died suddenly. When the doctor was trusted, this did not matter. But when the doctor inherited wealth as a result of the patient's death, a whole professional ethic was created to allow the system to identify whether or not the doctor had in fact murdered the patient.

From this professional crisis we get the procedures of death certificates, the impropriety of treating one's own family, and other parts of the now-traditional professional method of

practicing medicine. And it was designed — as the judicial system was designed — to be effective when the professional concerned was not trusted, rather than when he was trusted.

Both these systems were designed using the special technical knowledge and appreciation that only the particular professional can provide. Only a person knowledgeable in law could design the appeal procedures intrinsic in judicial practice.

Only a person knowledgeable in medicine could realize that the practice of not prescribing for your own family where life is threatened, is the only one which could prevent some unlucky doctor from being tried for murder.

In both cases, at the time of crisis when the profession was not trusted — just as data processing is currently not trusted — the professionals turned to their own specialized knowledge to design a system which would be workable even though distrust (and even professional dishonesty) remained.

It takes a thief to catch a thief, and it is simply no good waiting until an untrained society tells a profession what to do.

### No DP Crisis, Yet

Currently, the profession of data processing can hardly be said to be in a serious crisis. I know the *Wall Street Journal* is continuing its apparent campaign against DP. I know the credit bureaus and credit cards still make life miserable for data processing people who care

about their profession and who cannot answer the questions put to them by ordinary citizens.

But I still cannot believe that this is very serious, and instead regard it all as a forerunner of the coming real crisis.

These minor crises are showing the way people will react when the real data processing scandal breaks.

Equity Funding Life Insurance is not a real data processing scandal. The fraud there was organized by non-data processing people, and carried on through non-data processing means for years. It could have been caught in 1970 and 1971 by the auditors, or by the insurance investigators. I don't think it could have been caught until 1972 at the earliest by any data processing people.

The real crisis will come when a really sophisticated data processing scandal breaks, a scandal that can only be caught by data processors, because it is being handled by real data processing expertise (not just by the use of ordinary job control cards).

There have already been cases which came near to being this scandal, but as yet none of them has been big enough, or touched the necessary sensitive points of the public consciousness.

So we have time to prepare. We have time to design the ethical manner of practicing data processing so that data processing crooks get caught by data processors, and so time to save the honor of the profession itself.

In our preparations, we should consider those inessential items which make it possible for data processing to be "fixed." For instance, the practice of compiling an operational program, and then using the object-code version in the library, is clearly as open to abuse as leaving unstoppered, half-finished bottles of medicine in a doctor's consulting room. We should stop this dangerous habit.

The overhead involved in re-compiling the programs in a load-and-go manner, is less than the overhead involved in throwing out thousands of "perfectly good pills which have been exposed to possible contamination."

Just like the need for unquestionably good pills, the need for unquestionably accurate data is important. Therefore the practice of keeping libraries of operationally sensitive programs should be eliminated. The advantages are just not worth the risk.

We should also look to our recordkeeping and recordex-

amination practices. Is the file that was received this week the same length as the file that was produced last week? Are the control figures controlling the whole of the data or only part of it?

We must look at the facilities that we provide the auditing profession — and look at its knowledge of them. It is standard auditing practice to make contact with knowledgeable people inside and outside the installation.

If, as appears to be the case in Equity Funding, they fail to make contact with data processing people, is this not a matter subject to an official objection to the audit?

There are other practices which also should be eliminated, but these will be dealt with later. For now, it is time to create the special body of knowledge that will turn us into a real profession. And, for that realization, we must accept the Equity Funding case as a blessing in disguise.

© Copyright 1973 Alan Taylor. Reproduction for commercial purposes requires written permission. Limited numbers of copies for non-commercial purposes may be made provided they carry this copyright notice. The views expressed in this column do not necessarily reflect those of *Computerworld*.

### The Taylor Report By Alan Taylor, CDP



## Letters to the Editor

### DP Makes Fraud Harder to Commit

The recent stories about the Equity Funding scandal demonstrate the difficulty the media has in accurately reporting events in which computers are involved. The consensus seems to be that someone helped an electronic superbrain carry out a complicated fraud.

Actually, that abused computer made it harder for anyone to commit fraud and easier for someone to detect fraud.

One vital element in certain kinds of embezzlements (insurance, bank loans, installment purchases, etc.) is to alter key programs to have them bypass certain accounts. There are programs available which can spot any differences between a program which has been certified accurate (and is kept under auditor's seal) and the supposed duplicate of it which is running in the computer.

This one check would have stopped the Equity fraud very early in the game. Accounts can be randomly selected by a program and sent through a normal cycle of activity in the computer.

The billing, collection and cancellation printouts can then be compared against predetermined results.

And finally, a program can examine the entire master file (impossible manually in most cases) and calculate the amount

that should have been billed over a period of time.

Martin Burack

New York, N.Y.

### Can Programmer Make Ethical Judgments?

Three rousing cheers for exposing the Equity Funding "DP Fraud" [CW, April 25] for what it was — a people fraud. And a chorus of boos for *Newsweek*, most of the financial press including *The Wall Street Journal*, Equity's "auditing" firm, the California Insurance Commission and the Illinois Insurance department.

The insurance business, like almost any other business, has become increasingly complex and competitive. So complex in some instances, that the EDP analyst or programmer can no longer be expected to pass judgment on the ethics of a marketing study, a modeling project or even some financial reports.

Just as a programmer can hardly judge the adequacy of an engineering formula for structural bridge design, he cannot be expected to evaluate actuarial formulae or the treasurer's report.

The programmer does his job as outlined in project specifications. And if he is a professional, he does that job to the best of his ability.

Ron Stewart  
Manager

Systems and Programming Dept.  
United Insurance Co.  
Chicago, Ill.



## We make a very durable Teleprinter.

For 10 years Di-An has built tough printers for the most demanding military and OEM applications. That's why people who know us have already ordered thousands of our 9030 Teleprinters. Distributors such as TTS Systems of Los Angeles, Computer Planning and Supply of Chicago, and Vardon & Associates of Dallas make their money leasing terminals and therefore must evaluate them *thoroughly* before they buy. They bought Di-An's 9030 because it measured up to their standards. It'll work for you too.

Why? Just three simple moving assemblies and advanced integrated circuitry have replaced the complicated movements common in other asynchronous impact printers. You get improved reliability and lower maintenance costs. Add these tough-to-beat features: operator selectable 110, 150 or 300 baud transmission; half and full duplex or local operation; upper and lower case print; odd, even or no parity; form-feed tractors that adjust from one to 16 inches and 132 columns; six-part copy; vertical tabulation.

Sales & Service Nationwide

**DI-AN CONTROLS, INC.**

944 Dorchester Avenue  
Boston, Massachusetts 02125

NCC Booth #1338

# Generalized Data Base Packages Not Worth Cost/Risk

By Tom Gilb

Special to Computerworld

I challenge IBM to give well-founded total arguments for the use of generalized data base software (like GIS, IMS, VANDL, DBOMP, CODASYL, DBTG). I have never seen nor heard of any convincing total cost/risk argument for a generalized data base package as opposed to a simple self-developed package based on either standard Cobol/Fortran accessible access methods or assembly language coded subroutines, well insulated from calling high level application programmers.

Specifically, the suppliers do not know enough about the following factors in absolute terms, and they know even less about these factors in competitive terms (primarily as opposed to a do-it-yourself approach).

- **Portability:** To what degree is this software and the associated application programs movable to specified new environments such as future new association with other generalized packages (CICS, DOS/VS, VSAM); new secondary storage devices from same manufacturer (solid state); other suppliers' equipment and software?

In general it seems that the portability (cost of conversion) is very low compared to alternative techniques.

- **Implementability:** What does it really cost to evaluate, plan for, learn and program for such a system as compared to other systems? I challenge that assumption as never proven by comparative test.

In fact, it goes strongly against my own experience of building specific data bases based on standard high-level languages, as compared to the lengthy efforts of others to implement "ready made" packages.

- **Maintainability:** What is the cost of maintaining all aspects of this software as opposed to other methods? What is the cost of not being able to maintain major logical portions yourself? Some of these systems are as complex and demanding as any operating system and should thus require a system programmer staff.

- **Operational cost:** What do we know

about the additional operational cost as a direct or indirect result of making use of such a package. Not only present costs must be considered, but user control over future costs must be considered.

How much more processing time, core storage, etc. is necessary because a generalized package is used (as opposed to a tailored package).

- **Software Reliability:** Large generalized software systems tend to have an

uncontrollable quantity of bugs. Nobody, certainly not IBM, claims he even knows the theory behind software bug control. IBM's OS is completely out of control, it seems.

About seven years after initial delivery the bug rate has grown from 1,000 distinct new bugs reported per release in 1968 to over 11,000 new bugs reported

per release, according to counts in IBM's own bug report indexes in 1972.

Some of the most problematic bugs are reported to have occurred in the "simple" data base management method Isam.

What is the real price of these bugs for the generalized data base user? He doesn't have the documentation or the competence to analyze such bugs and repair them in a reasonable time

- **Supportability:** Which guarantees will IBM give for any given package that they will give full support for that package for a given number of years? Full support means that it will interface with all major developments in the hardware and software sector in this period so that the user will not be forced to abandon it in order to make use of new announcements.

- **Data security and reliability:** File security (access controlled via passwords) is if anything overdone for most users in the present packages. A far more serious problem is accidental destruction of data and records within a large and complex

data base.

I believe that the tools in the present software implementations are grossly inadequate to detect and automatically correct most of the random errors caused by hardware failure, software failure, application program bugs and human error. Most systems have some recovery/security features, but I believe that these are too general and too costly compared to some alternative techniques.

This is not necessarily IBM's fault but it does not provide sufficiently detailed design technique literature as a supplement to the generalized systems so that the user can carry out his "user responsibilities" (as defined by IBM in the data base package manuals) adequately.

The result is that many users will carry out their end of the reliability design of the data base inadequately, while hoping and believing that IBM has done this for them.

Tom Gilb is a consultant in Oslo, Norway.

## Viewpoint

# Small Size. Low Cost. It's the NCR



## Letters the Editor

### Special DP Task Force Unrelated to Doctors Group

Re: "Medical Record Problems Probed" in the April 25 issue.

Washington state doctors may have started investigating problems of computerized medical records. I know of a number of individuals who are indeed interested.

Most definitely, however, they had nothing to do with the special task force to develop legislation concerning the maintenance of confidentiality of computerized records. This task force was originated by the Washington State Medical Record Association, a professional group affiliated with the American Medical Record Association and totally unrelated to the physicians' professional association in this state.

Lynn Regudon

Chairman, Task Force on Legislation  
Washington State Medical Record  
Association  
Seattle, Wash.

### Anyone Selling \$60 Mini?

Re: April 11 article "Hardware 'Available' for \$60 Mini."

Where can I get a \$60 mini? I'd like the challenge of developing my own software.

Carl M. Vigil

Schertz, Texas

The reference was made by Claude Kagan at Western Electric, Box 900, Princeton, N.J. 08540. Ed.

## Descriptive Billing Expensive

By Kenneth E. Rohan  
Special to Computerworld

In regard to the article entitled "The Professional's Viewpoint - More Description Needed in Descriptive Billing Uses," [CW, May 2] Joseph Rigo's comments may render descriptive billing less cost-effective than country club billing.

Country club billing requires the credit-card organization to return all sales receipts along with the monthly bill to the cardholder. This means the organization must maintain a file of the incoming receipts for each and every cardholder on a monthly basis, which is an expensive proposition and the reason why many are leaning toward descriptive billing.

Rigo is absolutely correct when he says "a descriptive bill should be sufficiently detailed so that the person receiving it knows what he or she is being billed for."

Unfortunately, the cost of storing and printing such information on a monthly basis by the credit-card issuers could be equal to or greater than present-day coun-

try club billing costs. We are rapidly moving into the era of the credit-card reading terminal. The best place to capture total sales information is at the point-of-sale. Data would be available at the merchant's terminal and be easily transmitted to the central computer of the credit-card issuer.

Hence, credit-card issuers who do not or cannot make use of credit-card reading

### Viewpoint

terminals, will be hard-pressed to come up with an adequately described bill. Their only salvation may be a system whereby incoming sales receipts are recorded on video-tape during the course of a given month, sorted by image and cardholder sequence at billing time, and send printed copies of the cardholder's actual sales receipts.

Kenneth Rohan is director of Kenro Management Associates, Oceanside, N.Y.

## Letters to the Editor

### CDP Examination Performs Service To Profession

"Useless," "dead," "too easy" and "never work" are a few of the phrases I've read in *Computerworld* recently regarding DPMA's CDP examination. It seems to me that skeptical people assuredly used these same phrases in commenting on the Wright brothers' attempt to get off the ground.

Having taken the 1973 CDP exam, I offer the following comments:

It is absurd to state that "cramming from one of the study guides" can insure easily passing the exam. The study guides are "reviews" by nature and unless there is the necessary supporting experience, they are just so many words.

The exam is a good objective evaluation of an individual's DP and general management skills. The majority of my associates (eight of us took the exam) appreciated the objectivity and worthiness of the

questions.

Classroom and seminar preparation for the exam and/or passing it assuredly demonstrates a broader DP knowledge level.

A CDP has evidenced a quest for professional certification - the true professional is the first of his profession to seek this certification.

He has also shown a broader base from which to adapt to the DP environment and the ability to place DP in its proper perspective with the other functions of operating a business.

While I too feel the exam must be time-phased to be more relevant, I am convinced that DPMA has performed a great service to our profession in pioneering this certification program. I am also convinced that DPMA will maintain the exam, improve it and develop it into the equivalent of any profession's certification.

Michael D. Campion  
Project Leader

Inso Systems Corp.  
Manufacturing Systems  
Neptune, N.J.

### Competent Hand-Holding Can Make the Difference

Re: "It's the Hard Way to Break Into DP" [CW, March 28] and "Holding Hands Can Be Painful" [CW, April 25].

Perhaps the problems encountered could have been greatly lessened by choosing the right vendor.

We converted from a service bureau to an IBM System/3 Model 10, with very little help from the service bureau. However, the support from IBM was nothing less than fantastic. They literally held our hand every step of the way, from training, to conversion, to production. The only difference was the competence of the people holding our hand.

I find it very hard to believe that any vendor still in business would allow its customers to write one superprogram designed to do all. Mounds of experience are not needed to know that some sort of data base is imperative.

Perhaps the extra rental charge incurred from going with the "giant" should be viewed in a different light: Is it really worth the monetary savings to get a system that doesn't work for you?

Thomas E. Negola

Garwood, N.J.

### RPG Efficient, Economical

I have been reading several letters to the editor in the past two issues of *Computerworld* concerning RPG languages.

It is my belief that the authors of these letters are not as knowledgeable of the true power of RPG as their letters would insinuate.

Norman F. Allen wrote [CW, April 25] that he believes an RPG installation is an "operational nightmare." He points out that the company involved in the operation could develop "heart failure due to some key personnel involved in the RPG program going on vacation." Any organization that is so reliant upon any individual, be it an RPG programmer, Cobol or any other language, is in itself a failure.

Before anyone criticizes RPG languages, I recommend they be involved in paying all expenses connected with data processing. RPG is a management tool geared for an efficient and economical method of producing the necessary reports and results.

It is time that the RPG language be given full exposure as to its capabilities and efficiency. Perhaps the biggest injustice performed was to call the 360 version of RPG, RPG. This has caused many persons to equate the 360 version to the old 1400 version (which was by far no competition to the current version).

Philip J. Pesapane  
President

Computer Procedures Corp.  
Valley Stream, N.Y.

# Big Performance. Century 101.

Now small and medium size businesses can have the big kind of computer power they need to grow.

The newly released peripherals for the NCR Century 101 processor are small in size and low in cost, yet they provide the power and versatility of units twice their size.

This basic 101 system, including processor, card or paper tape reader, line printer, and one dual platter disc unit covers no more space than 2½ feet by 10 feet! It can be placed in rooms where larger computers just won't fit. And, because it generates little heat, air conditioning requirements are minimal.

Big advantages in small packages include freestanding add-on dual platter disc units, each having a storage capacity of 10 million bytes. A line printer that turns out 300 lines of crisp printing per minute. And an optional 30-character per second I/O Writer.

The 101 processor, heart of the system, includes features like a high-speed memory that can expand in practical increments from 16K to 64K. An optional multiplexor that provides control for 10 communications lines, with no increase in cabinetry. Seven-way to nine-way simultaneity. And many other features just as significant.

Later, as your business grows, you can expand this modular system to meet increased information requirements. Larger capacity disc units and higher speed printers can be added if and when you need them.

For the price, this new system from NCR offers big performance for businesses on the grow. Average systems range from just \$1820 to \$3800 per month!

Call your local NCR office for the specific advantages your business can expect from this newest member of the NCR Century family.

**NCR**

Computers & Terminals



lightweight, pedestal type LINE PRINTER turns out 300 lines of crisp printing per minute.



the 101 PROCESSOR features high speed expandable memory, optimum hardware/software efficiency, dramatic throughput capabilities. CONTROL CONSOLE facilitates communication between operator and processor. Hard working CARD or TAPE READER (COT) assures fast, reliable coded input.



DISC FILE storage provides ten million bytes of ready information in each single spindle dual platter disc unit.

## Letters to the Editor

### Afips Report Refers To New DP Entrants

The letter from Steven R. Weber in the May 2 issue of *Computerworld* suggests that the American Federation of Information Processing Societies (Afips) drew the wrong conclusions about the availability of trained computer personnel in its recent report entitled, "The State of the Computer Industry in the United States" [CW, April 11]. Unfortunately, Weber appears to have rushed into print without reading the Afips report.

The only conclusion on manpower included in the Afips report is, "In view of the growth of formal programs in computer education, it appears that within a decade such sources should be able to fill the needs of the computer industry for new entrants even if industry requirements grow at the rate of 10% per year."

There is absolutely nothing inconsistent between this statement and that of the Advertising Council that the lineage of help wanted advertising for data processing personnel is at a high level. The Afips conclusion refers to the next decade and it addresses the new entrant situation, not the need for experienced personnel.

Bruce Gilchrist  
Executive Director

Afips  
Montvale, N.J.

### Keypunch Replacement: A Success Story

Re: the article in the April 11 issue about keypunch replacement.

Our firm has been successfully converting keypunch input operations to 2260 on-line entry for the past three years and have at this time completely converted the operation.

Some of the jobs include order entry, order update, customer master file addition and change, price change, accounts receivable, accounts payable, inventory entry and activity detail, payroll, department transfer functions and other forms of entry.

We have experienced *no* decrease in speed of entry of 8,000 to 9,000 items daily and have found it to be more accurate because of the immediate verification.

R.A. Hoover  
DP Manager

Coastal Data Inc.  
San Francisco, Calif.

# The Olivetti girl presents her family



Meet the direct descendants of a distinguished line of Olivetti information systems that started a half-century ago. It's a big, big family adaptable to almost any situation. With over 50,000 already installed! Teleprinters for administrative tasks. High-speed buffered systems for full-service banks and savings institutions. Smart terminals that communicate with computers and each other. All displaying those fine old Olivetti family traits of ingenuity, great design and terrific service backup. (There are Olivetti branch offices all over the U.S. with trained personnel on call!) Ask us for a proposal on your next terminal installation. Join the family.

## of Olivetti Terminals:



**olivetti**

The American Dream Machines

office typewriters  
portable typewriters  
adding machines  
calculators  
word processing systems  
accounting systems  
electronic billing systems  
microcomputers  
on-line systems  
office copiers

## 'An Operator Mounted The...WRONG TAPE'

The lost time may never show up — but it cost real dollar\$

Every day, in thousands of data centers throughout the country, this same scene is repeated. It can be prevented. Value Computing has developed a new and different approach to Tape Library Control. The VALU-LIB system will tell your tape librarian which tapes to withdraw to get the best multiprogramming schedule, and then generate the labels, if you'd like!

OS/DOS, standard, non-standard and unlabelled tapes — they're all the same to VALU-LIB.

VALU-LIB integrates with the other Value Computing products, to provide a total system.

\$4,000 DOS version \$6,000 OS version



496 Kings Highway North, Cherry Hill, N.J. 08034 (609) 667-8770

value computing inc.  
496 Kings Highway North  
Cherry Hill, New Jersey 08034

GENTLEMEN:  
PLEASE SEND INFORMATION ABOUT  
☐ VALU-LIB TAPE LIBRARY  
☐ CALL ME FOR AN APPOINTMENT

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

TELEPHONE \_\_\_\_\_

## Random Notes

### AED Programming Language Available for Univac 1108

WALTHAM, Mass. — A Univac 1108 version of the AED programming system is being offered by Softech, Inc.

The system consists of a compiler for the AED programming language, and various libraries and support programs.

With this offering, AED is now available for the CDC 6000 series, Univac 1108 and IBM Systems/360-370, as well as for various minicomputers.

Programs developed in AED are transportable between any of these systems.

Purchase price for AED-Univac 1108 is \$15,000 and includes one year's maintenance and a program of user training, from 391 Totten Pond Road, 02154.

### Cullinane Output Packages Linked to RDMS Data Base

BOSTON — Cullinane Corp. has announced that all its report-producing systems are now operational with UCC's "RDMS" data base system for banks.

Concurrent with this announcement, the firm stated that Market-EDP-Analyzer is available for use with data base systems such as IMS, Total, RDMS, Bomp and Alis.

Cullinane Corp. is at One Boston Place, 02108.

### Basic Added to Datapoint 2200

SAN ANTONIO, Texas — Datapoint has announced an extended Basic language processor for the Datapoint 2200 intelligent terminal. It is a stand-alone system requiring a 16K Version 11 Datapoint 2200.

This implementation of Basic includes a floating point arithmetic package, support for two dimensional arrays of strings or numbers, internal subroutines and error recovery techniques. Other languages on the Datapoint 2200 include Databus, Scribe and an Assembly Language. Datapoint is at 9725 Datapoint Drive, 78284.

### Terminal Users Write Letters

NEW YORK — Personalized form letters can be generated on-line, from original draft and definition of addressee list through final typing, under the Word/One service from Bowne Time Sharing Inc.

Working at a terminal, the user creates the master letter and specifies where personalized inserts should be made. The master letter is merged with a pre-stored name/address list that also contains the specific information to be inserted. The final letters can be produced on the user's teletypewriter or, in case of a large mailing, on Bowne's high-speed line printer.

Bowne operates Word/One in the eastern U.S. and is based at 345 Hudson St., 10014.

## New Cobol Feature

# Users Can Pick Collating Sequences

By Don Leavitt  
Of the CW Staff

WASHINGTON, D.C. — Cobol programmers would have very broad powers to specify, program by program, the collating sequence to be followed during the execution of their logic, and the code set to be used by the files being processed, under changes voted into the language by the April meeting of Codasyl's Programming Languages Committee (PLC).

The change was requested by the American National Standards Institute Committee X3J4, which later voted to include a restricted version of the new capability in the proposed Cobol standard revision [CW, April 4]. Action on the collating sequence feature was handled on a priority basis to answer a number of user requests received during the open comment period. X3J4 chairman Robert Kearney of Bell Labs noted.

Even the restricted implementation should make both programs and files "far

more transferable than they have been up till now," according to PLC secretary William Rinehuls of the U.S. Air Force, who proposed the change.

Cobol is supposed to make programs transferable and there has been movement in that direction, especially since the 1968 Cobol standard. PLC has the job of defining Cobol as a complete language system; X3J4 extracts what it feels is a workable subset of the whole language, refines it into a voluntary standard.

But prior to the latest PLC action, the collating sequence used by programs has been determined by the "native" code set of the computer system on which the programs were developed, and they could not be altered to match the sequence scheme of a different code set.

### Override 'Native Mode'

Now the programmer will be able to override the "native mode" bias of whatever compiler and machine combination

he is using. PLC voted to give the programmer both static and dynamic capabilities to specify the setting he wishes. X3J4 added just the static facility to the upcoming Cobol standard revision.

The static option allows entry of a completed COLLATING SEQUENCE IS clause in the Environment Division, so that the compiler could shape comparisons and other sequence-dependent instructions for the code set being used. The dynamic option would allow the clause to be completed or changed just prior to program execution, or even in the middle of a run.

PLC voted to allow many possible ways to complete the COLLATING SEQUENCE IS clause, including a "native mode" sequence that is peculiar to the implementation, or one that is user-defined through a string of literals listed in exactly the sequence required. X3J4 accepted all the options, except those that only pertained to the dynamic capabilities.

While user control of collating sequence focused primarily on the Nucleus of the Cobol language, related capabilities were also added to the Sequential I/O module and to the Sort/Merge. These will allow the program to work with tapes and other non-mass storage files, coming from or going to systems working in codes other than the one to which the user's program is "tuned" through the Nucleus entry.

User control of collating sequence, especially with the user-defined feature, is expected to allow placement of records in precisely the sequence the user wishes, regardless of the mix of numerics, alphabets and special characters the control field may contain. An EQUATE capability will allow the user to determine exactly where, for example, the 797 Corporation, or du Pont, or D'Unger belong on his files.

## 'Valu-Lib' Runs Tape Library, Can Interface With Scheduler

CHERRY HILL, N.J. — A magnetic tape library control system that differs from most others by including an interface to both a scheduling package and a job accounting system, is now available for both OS and DOS/360 users, from Value Computing Inc.

Valu-Lib accepts data from IBM's System Measurement Facility (SMF) under OS, or from feedback cards generated by DOS operations. It creates, changes and deletes information from a Workload Control File, and produces a Tape Retention Report and a daily Scratch Tape report.

The Control File has three basic sections, one of which hold the number, manufacturers' names, locations and reporting exception limits of the tapes to be controlled. It also includes volume serial number information to identify the specific tapes, and job information to identify the applications — and programs within the applications — in which each tape is to be used.

When used with Value's Scheduler package, the file produces a "tape pulling" list to notify the operations staff which files will be needed over various periods in the future. Later, it also produces gummied labels for external identification of the files created during the just-completed processing.

Even without Scheduler, Valu-Lib can generate a tape pulling list based on frequency codes built into the control file records. This list is in job number sequence rather than scheduled-time sequence as it is through the link-up with Scheduler, a Value spokesman noted.

In stand-alone mode, Valu-Lib can also print gummied labels as tapes are created. These labels can include prompting comments to show, for example, that a given reel is the last of five making up a large file.

The system is written in Cobol and can be used in either OS or DOS environments. It requires 50K bytes of memory, spool-in/spool-out capability, 50 cylinders of disk storage and, if SMF is used, a tape for that data. The price is \$4,000 for DOS, and \$6,000 for OS users.

Value Computing is at 496 North Kings Highway, 08034.

## Package Builds GCOS/TSS Tests

McLEAN, Va. — Tesdata Systems Corp. has developed a Load Generator System that allows Honeywell H600/6000 GCOS/TSS installations to test configurations under large user loads. The testing package pinpoints the conditions under which response time degrades to an unacceptable level — as defined by the user.

Need for the Load Generator became apparent, Tesdata explained, as a result of work the company is doing for Honeywell that will enable GCOS/TSS installations to support as many as 180 simultaneous terminal users. Those and other changes to the operating system will be released in October, Honeywell said.

Regardless of how large a terminal load is being generated — and Tesdata noted that actual jobs are created, not simulated — all the testing under Load Genera-

tor is done from one on-line terminal. Output consists of user response time data for each generated activity.

The Load Generator allows the user to measure exactly what effect a change in configuration, whether internal buffer size or device used for program swapping, will have on response time.

The package enables an installation to perform hardware checkouts and to pinpoint malfunctions that may only occur with very heavy user loads.

The Load Generator has been successfully installed on both H600 and H6000 single and dual processor systems, he added, and the package is now available for a lease price of \$1,000/mo or under a 20-year license for \$15,000.

Tesdata is at 7900 Westpark Drive, 22101.

# For MMS General Ledger Users 1973 Will Be A Vintage Year.

Since January, 7 companies ordered the MMS General Ledger System. Each one of these corporations is worth more than \$20 million (one is in the \$800 million class). They all have the programming staffs and resources necessary to develop their own corporate financial systems. Instead, they chose the MMS General Ledger. A software package.

Their reasoning is simple: it costs less to use a proven package (more than 50 users have installed it in the past three years). Also, it fits your needs rather than the other way around.

For these happy users, 1973 will be a vintage year. Call or send in the coupon today. Then get ready to join the celebration.

Cheers!

I'd like a taste of the following MMS Financial Reporting System(s). Please send me information on:

|                                               |                                              |                                           |
|-----------------------------------------------|----------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> General Ledger       | <input type="checkbox"/> Accounts Receivable | <input type="checkbox"/> Accounts Payable |
| <input type="checkbox"/> Inventory Management |                                              |                                           |

name \_\_\_\_\_ title \_\_\_\_\_  
company \_\_\_\_\_ street \_\_\_\_\_  
city \_\_\_\_\_ state \_\_\_\_\_ zip \_\_\_\_\_  
computer system \_\_\_\_\_ phone \_\_\_\_\_

Send to  
**SOFTWARE INTERNATIONAL CORPORATION**  
A subsidiary of MMS, Inc. Dept. W-1  
279 Cambridge Street, Burlington, Mass. 01803 (617) 272-2970  
New York (212) 972-9540 Chicago (312) 256-2250 Los Angeles (213) 437-3301

## T/S on PDP-11/45

## DEC Puts 32 Users on Maximum RSTS/E Configuration

MAYNARD, Mass. — PDP-11/40 and 11/45 minicomputer installations are able to support as many as 32 simultaneous terminal users working in an enhanced Basic, with the extended version of the RSTS time-sharing system (RSTS/E) now available from DEC.

RSTS/E requires a minimum configuration of 40K words of memory which would allow one user to work in as much as 16K words — twice the previous limit, or two users to work with 8K words. Maximum configuration is 124K words, a company spokesman noted.

The superset of original Basic provided by RSTS/E is called Basic-Plus and includes:

- Record I/O, which allows each user to access disk files both randomly and sequentially, and to adjust buffer spaces and disk allocation techniques to optimize throughput.

- Virtual memory arrays that can

consist of integer, floating point and character data.

- On-line access to all system peripherals, including shared use of files where appropriate.

- Language extensions to permit more sophisticated program logic than the original, low-key language would allow.

## Larger Arrays

The array processing under RSTS/E allows the user to store arrays larger than available in real memory out on disk and to maintain and use them as if they were stored in real memory. Swapping of the parts being utilized is completely transparent to the user, DEC said.

While RSTS/E permits as much as 16K words to be allocated to a single user, it does not require that all users get that much space. The system manager can, for example, limit users to no more than 8K so that the system resources are in fact

shared in a reasonable way, and not "hogged" by one or two jobs.

Under a job control system that is part of the supervisor, programs can be chained from on-line disks without operator intervention, to simplify execution of complete applications.

RSTS/E permits the use of mixed core and semiconductor memory to reduce the time spent in system overhead. Users are encouraged to load their RSTS/E Basic interpreter and the run-time system in a 16K word segment of semiconductor memory — with cycle time of 450 nsec — while the application programs utilize standard core memory — with cycle time of 900 nsec.

Typical system costs range from \$82,000 to \$195,000. An \$85,000 system is configured around a PDP-11/40 with 40K words of core memory. Peripherals include a fixed-head system with 256K words of storage and a moving-head

disk system with 1.2M words, two DEC tape units and eight line interface units. Terminals are not included.

The \$195,000 system is configured with an 11/45 with 64K words of core memory, a floating point processor and 16K words of semiconductor memory.

Peripherals include 40M bytes of moving-head disk storage and 512K words of fixed-head disk storage, tape drive, 300 line/min. printer and 32line interface units.

## 20 Users, 124K Words Supported by 'Mumps' From Software House

WAKEFIELD, Mass. — Mumps, a multi-user timesharing operating system and programming language first developed for hospitals but now being applied in non-health care operations as well, has been enhanced by Automated Health Services Inc. (AHS) to run on the DEC PDP-11/45.

By shifting Mumps to the top of the "11" series, AHS has been able to utilize DEC's memory management system to control core addresses above 28K, the effective limit on the smaller PDP-11s. Now, 20 or more interactive users can work with Mumps concurrently on the 11/45 which has an effective core of 124K, the company said.

Mumps was created for applications requiring sophisticated data base management and rapid information retrieval. It uses unique file structures called "globals," which are processed like sparse arrays. The new Mumps allows the user to work with blocks within "globals" and these may be created, modified, deleted or moved from one file to another without having to handle the entire array.

Memory segmentation for large-scale systems is available, AHS noted, and interprocessor communications facilities permit a Mumps-based 11/45 to be linked to other CPUs for more flexible operations.

Application programs are available in the Mumps language, especially in hospital-related functions, but innovative users have applied Mumps to work in other projects including, for example, control of a containerized shipping operation, AHS said.

AHS can install Mumps on any DEC PDP-11 with at least 16K core and a CP clock for time-slicing, a disk and a backup storage media, and terminals, including either teletypewriters or CRT devices. The Mumps software, exclusive of application packages, is \$10,000.

Programs for clinical laboratory information processing, hospital administrative functions, clinic managements, patient interviewing and multiphase health testing control and documentation are among the applications which AHS can tailor to a user's specific needs.

AHS is at 607 North Ave., 01880.

## Seven Areas to Gain GE On-Site Support

BETHESDA, Md. — GE's Technical Services Operation, providing on-site support, custom software and specialized systems development for users of Mark III remote-computing services, has been extended into seven metropolitan areas. New offices are being set up in New York, Chicago, Atlanta, Houston, Boston and Los Angeles. The original office at 7735 Old Georgetown Road, here, will continue to serve the Washington, D.C. area, a spokesman noted.

The service should be "especially useful" to firms confronted with unusually complex applications or seeking to optimize their use of GE resources, he added.

## WE RENT/LEASE MINICOMPUTERS.

We're Rental Electronics, Inc., and the minicomputers we rent/lease are Data Generals Nova 1200 series, with up to 32k core memory, and standard central processor options, interfaces, peripherals, and software (availability of software based on hardware configuration). Field service is performed by Data General's own field engineers. With a three-year lease, an 8k Nova 1200 with a teletypewriter (purchase price approximately

\$9,800) costs less than \$250 per month, plus maintenance if desired. The same system, on a month-to-month basis, with maintenance, costs about \$784 per month. Or, under a rental-purchase agreement, it's \$980 per month, with a full 80% applied to your purchase after six months. For complete details, just write or call. We'll send along a detailed brochure.



**Rental Electronics, Inc.**

A PEPSICO LEASING COMPANY

99 Hartwell Avenue, P. O. Box 223  
Lexington, Massachusetts 02173 Tel. 617/862-6905

# You can tell a lot about BASF/Endura computer tape from the professionals who use it.

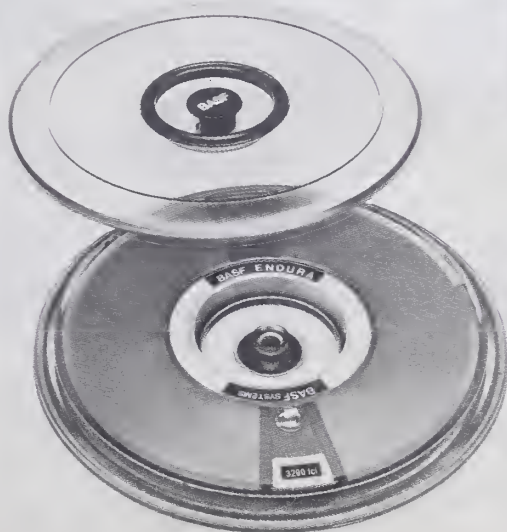


They're the people who demand more from a computer tape than just accuracy.

They want accuracy *plus* the kind of long-term savings they can really brag about.

They're Medical people. Data processing experts. Chemists. Researchers. Construction engineers. They're people whose tape has to meet today's requirements as well as future 3200/6400FCI expectations.

And BASF/Endura gives them what they need. With less wear and tear on tape heads. More hours of error-free performance. Greater savings now...and later on.



BASF/Endura. Every day all kinds of demanding people are finding new ways to make it pay.

Discover what it can do for you. Ask your local BASF Salesman for all the facts on BASF/Endura computer tape. Or write BASF SYSTEMS, Crosby Drive, Bedford, MA 01730.

**BASF SYSTEMS**  
Division of BASF Wyandotte Corporation



## BASF for people who really know.

# Datapoint delivers at Executive Data

**Executive Data Systems, Inc.**, Cedar Rapids, Iowa, is a national leader in supplying computer utility services to the health care field. Currently over 100 hospitals and health centers are subscribers to Executive Data's computing services for applications in general administration, patient accounting, medical diagnosis, laboratory analysis and many other critical areas. The great majority of Executive Data subscribers are now utilizing Datapoint 2200 systems and printers as on-site terminals for data entry, for data communications (to Executive Data computers in Cedar Rapids) and increasingly for on-site data processing.

**Why Datapoint?** "The Datapoint 2200 meets the needs of our hospital and health center clients more fully and more satisfactorily than any other computer system," notes Don Olson, Executive Data president. "Its full programmability and the availability of DATABUS, a high-level programming language, makes it easy to adapt the system to the varying data entry requirements of our clients. On the 2200's video screen we can display the precise format for data to be entered, which, combined with programmed error checks, virtually eliminates input errors. Since the 2200 is as easy to use as a typewriter, there's no need for special operator training as with a keypunch machine. During the day the transmission of data to our central computer occurs automatically, without the need for manual dialup. Similarly, needed management reports are sent out automatically from our central computer during the night to an unattended 2200 printer, ready for management to use the very next morning, when the information is really timely and useful."

**Every hospital and health center** has varying needs for computer service, which can range from simple bookkeeping to sophisticated computerized analysis. Executive Data's approach is to provide these services on a modular basis. "Because the 2200 is a fully programmable general computer, it can handle much of the burden of editing and pre-processing of data," said Mr. Olson. "This relieves much of the overall processing load on our large central computer systems. Additionally, as hospital users grow more sophisticated and demand more and varied applications, we expect to see the Datapoint 2200 used more frequently as a supplemental independent processing unit."

**The Datapoint 2200** and associated peripherals have delivered the goods for Executive Data Systems and its numerous hospital subscribers in a variety of applications in data entry, data communications and dispersed data processing. Prices on this unique system begin as low as \$6,040. For information on how this capability can be put to work in your operation, contact the Datapoint sales office nearest you or write or call: Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284.



*"The Datapoint 2200 has been a key factor in the continued growth of Executive Data and in our ability to provide the finest computing services in a modular and economic fashion to our clients. As the health care field grows more aware of the capabilities of our service in combination with Datapoint systems, I anticipate a steady rise in the number of our subscribers and in the processing volume we undertake for them."*

*Don Olson, President,  
Executive Data Systems, Cedar Rapids, Iowa*



**Home Office:** 9725 Datapoint Drive/San Antonio, Texas 78284/(512) 696-4520 • **Direct Sales Offices:** Chicago (312) 671-5310 • Detroit (313) 557-6092 • Los Angeles (213) 645-5400 • Minneapolis (612) 854-4054 • New York (212) 759-4656 • Orlando (305) 671-4500 • Phoenix (602) 265-3909 • Portland (503) 244-0101 • San Francisco (408) 732-9953  
**Sales Representatives:** Albuquerque (505) 255-0120 • Boston (617) 237-2090 • Cocoa Beach, Fla. (305) 727-3205 • Dallas (817) 265-7745 • Darien, Conn. (203) 655-4800 • Denver (303) 771-0140 • Houston (713) 626-0010 • Liberty, Mo. (816) 781-0400 • Philadelphia (215) 272-1444 • Salt Lake City (801) 272-3681 • Washington, D.C. (301) 937-2215  
**International Representatives:** TRW Data Systems/Toronto/Ontario, Canada/(416) 481-7288 • TRW Communications/Lyss/Berne, Switzerland/Telex. 845-34446  
• TRW Electronics-International/Los Angeles, California/Telex. 674593

## Data Briefs

### Incoterm Sees Bell CRT Cost '500% Below' 3270

WASHINGTON, D.C. — AT&T's Model 40 CRT will be priced between "400% and 500%" lower than comparable IBM equipment. The Model 40 will cost between \$3,000 and \$3,500 while an IBM 3270 system costs about \$16,070, according to Incoterm Corp.

The comparison was included in a letter to the Federal Communications Commission from Incoterm, which had previously told the FCC that the Model 40 marked the Bell System's entry into the area of data communication terminals [CW, Feb. 21].

AT&T responded that the proposed CRT, to be built by Teletype Corp., was not a data processing service [CW, March 28]. Incoterm said the AT&T reply was "evasive and misleading."

The independent CRT firm said "AT&T's real interest is . . . data processing . . . where the primary function of the Model 40 would be for the generation of inquiries and the reception of data from a central computer."

### Modem Operates Automatically

TARZANA, Calif. — Novation, Inc. is offering an automatic answer/originate data modem which has unattended data reception capability.

The ATM-103D is Bell 101C and 103 compatible, and was designed for Teletype and TWX users, as well as Data Phone service.

The equipment features self-testing capability, optional voice capability, on-line local mode, echo mode and selectable full/half duplex.

Installation requires no modifications to the Teletype unit, the firm said, and all access is through normal connectors and terminals.

The unit costs \$550 and should be available within a month from 18664 Oxnard St., 91356.

### Concentrator Handles 32 Channels

NORWOOD, N.J. — Timeplex's C-32 Data Channel Concentrator can handle up to 32 channels which share up to 16 computer ports.

The C-32 is designed to connect data from modems, terminals or multiplexers on a first-come, first-served basis, making the connections in response to such signals as Data Terminal Ready, Ring Indicator or Request to Send.

The C-32 requires no speed or code programming and can switch asynchronous or synchronous data at rates up to 9,600 bit/sec.

Prices for the Timeplex C-32 start at \$3,250 and delivery is 60 days. The firm is at Box 202, 65 Oak St., 07648.

## Harris 4705 Replaces IBM 270Xs, 370Xs

DALLAS — Harris Communications Systems Inc. has introduced the 4705 communications controller which is described as a replacement unit for IBM's 270X, 3704 and 3705.

The 4705 can operate on the multiplexer channel of 360/370 mainframes and features faster internal speeds than the IBM 3705. The Harris unit has a 1  $\mu$ sec read-write time compared with 1.2  $\mu$ sec for the 3705. And the read-only memory operates in 250 nsec compared with 400 nsec on the 3705, according to a Harris spokesman.

The 4705 has a separate console printer while the 3705 normally uses the host CPU console. The Harris controller can utilize either a Model 33 KSR Teletype or a Cope 1035 which is equivalent to an IBM 2741 teleprinter. With these two options, the user can load his emulator and/or diagnostics using either paper tape or magnetic tape input, in addition to

utilizing the host console.

The 4705 responds to IBM system addresses, commands and data sequences in the same manner as IBM controllers and it can operate with Btam, Qtam and Tcam without programming modifications, according to Harris.

The controller supports both two-wire and four-wire facilities and handles both synchronous and asynchronous lines from 45.5 to 9,600 bit/sec. A typical system supporting four bisynchronous and 20 asynchronous low-speed lines will cost about \$1,276/mo.

Rentals will be about 12% below the 3705 while purchase prices will be about 15% less than the IBM unit, a spokesman estimated. First deliveries are scheduled for June.

Harris is at 11262 Indian Trail, Box 44076, 75234.

### '30% Causing Harm'

## AT&T Blames Non-Bell Equipment

By Ronald A. Frank  
Of the CW Staff

WASHINGTON, D.C. — About 30% of the customer-provided communications equipment interconnected to the phone system is actually causing harm to the network, according to AT&T.

In a submission to the Federal Communications Commission, AT&T said customer-provided equipment has "a higher trouble rate" than phone company equipment. Customers with non-Bell units "tend to call the telephone company when they experience a problem . . . and this results in a diversion of telephone company repair personnel" away from maintaining Bell equipment.

In a letter sent to the FCC's common carrier bureau, AT&T said 8.5% of users with non-Bell equipment on interstate private lines "are applying signal power in excess of the established criteria, thereby degrading the service of other customers." The criteria used for determining the harm were based on a report by the National Academy of Sciences on interconnection issued in 1970.

"A significant number of users of customer-provided equipment are causing harm to the telecommunications network both on private line and switched network services," AT&T said. To remedy the situation Bell said "it is clear that preventive network protection rather than corrective action is needed to ensure that services . . . for all users are not degraded . . ."

In a two-month period during 1972, Bell said 10,224 trouble reports at installations using non-carrier equipment on both dial-up and private lines were studied. In 48% of these cases the "source of the trouble was found to be in the customer-provided terminal equipment."

This represented "almost 30,000 unnecessary dispatches of our repairmen to tell the customer his equipment was at fault." But at the same time Bell admitted that 38% of the trouble calls were caused by telephone company equipment.

In the 4,973 cases where customer-provided equipment was to blame, 30% were actually causing harm to the phone network, Bell told the FCC.

Citing a "case history," AT&T said a "computerized inventory control system for a food store chain" with independent data sets "in Missouri" had experienced "excessively high error rates." The data set supplier "made an effort to solve the problem by increasing the signal power of the customer-provided data sets through the installation of amplifiers on the circuits." The amplified signals were "30 to 100 times the proper adequate level," Bell claimed.

The amplifiers were "generally installed between the data set and the [Bell] Data Access Arrangement" so the network was protected from the harmful effects, the letter said.

Some of the amplifiers were installed between the DAA and the line but there were "few such connections" and the

resultant harmful effects were "not readily identifiable," AT&T said.

But the high error rates continued and "after a lengthy investigation," the problem was traced to a "timing problem between the customer's computer and his data sets," AT&T said.

As part of its comments, AT&T included photos of independent data sets where it was possible that "hazardous voltages" could be applied to telephone lines. The data sets shown in the photos were not identified, although they were described as "commercially available."

Asked by *Computerworld* whether AT&T would identify the non-Bell equipment which was claimed to be defective and/or the Missouri data user who had excessive error rates, an AT&T spokesman said the company had no comment.

An FCC spokesman said the commission could ask the phone company to provide more details but a decision had not yet been made.

## NCR 255 Checkout Terminals Handle Store Transactions

DAYTON, Ohio — NCR has introduced an interactive minicomputer-controlled terminal system designed to handle supermarket checkout operations.

The 255 system includes the 726 mini and a terminal that includes an MOS read-only memory. The processor operates in real time with the checkout terminals handling transaction data on a character-by-character basis.

The 255 system is modular and will allow later addition of scanning equipment to detect the recently approved Universal Product Code when a majority of supermarket products are marked with the symbol. In addition, the system can be equipped with a remote display for management, electronic scale and coin dispensing equipment.

Each terminal prints out customer

receipts, calculates taxes, allows for coupon redemptions, gives food stamp credits and performs all arithmetic functions associated with the checkout transaction.

The 255 system can supply management with complete operating data including volume of sales by item, hourly sales totals, operator productivity and sales by department.

The basic processor includes 20K 16-bit words which can be expanded in 4K increments up to 32K. The mini costs \$13,000 and the basic terminal is priced at \$2,895.

A check endorsement option adds \$300 to the terminal price. Up to 48 "devices" including terminals and options can be handled by one processor. First deliveries are scheduled for this fall.

**W** The AJ 841 has proven itself in many direct comparisons with other terminals as the most reliable Selectric-based terminal on the market. We are steadily gaining customers on the basis of our outstanding performance and reliability. **W**

Gerard W. Schoenwald, Director of Marketing



## With the AJ841 you get MORE than a Reliable Selectronic™ Terminal.

Look at what the AJ 841 Selectronic Terminal has to offer—a heavy-duty IBM Selectric printer mechanism, plug-in circuit card electronics, plus . . . a two-character buffer for error free typing, a built-in modem, and the most attractive styling of any printer available.

But, look what's behind the AJ 841 design—engineering

and manufacturing know-how that assures AJ quality, our own sales and service staff in over 30 cities, and the option to buy or lease . . . direct from us.

We also offer non-impact printer terminals, teletype terminals, cassette recorders and a variety of couplers and modems. Why not let us show you that we're . . .

Advertising Dept., Anderson Jacobson, Inc.  
1065 Morse Ave., Sunnyvale, California 94086

- ☐ Send me the AJ 841 brochure
- ☐ Send me info on your other terminals
- ☐ Have someone contact me

NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE \_\_\_\_\_

More than a terminal company

**AJ Anderson Jacobson**

1065 Morse Ave. ■ Sunnyvale, CA 94086 ■ (408) 734-4030  
Sales offices in principal cities throughout the U.S.A.

# **THE REASONS TO KEEP YOUR IBM 1130:**

# THE REASONS NOT TO:

**Throughput.** You already know there's a limit to the throughput your 1130 can handle. If you haven't reached that limit yet, you probably will. Then come the problems. You don't want to move up to a more expensive system. You don't want to rewrite your software. You don't want a lot of grief. We think you should check into our "Super" 18/30 DMS. It's a direct 1130 replacement that gives you three to ten times the throughput at about the same cost. And it still uses all your existing programs.

**Real Time.** Your 1130 doesn't have real time capability. Our 18/30 does. It's a fourth generation computer with real time, multi-programming (on-line CRT, etc.) capability. And we're prepared to help you make the conversion to real time, now or any time you are ready.

**Money.** The 18/30 does much more work for almost exactly the same number of dollars. And lets you avoid having to move up to a bigger, more expensive computer with all new software to write. The result: enormous savings in dollars, downtime and anguish.

**None of the above.** Even if you aren't throughput-bound and couldn't care less about real time at the moment, we can still help you cut costs. Our "Mini" DMS also works with your 1130 software and gives you at least the same throughput (much more in disk work). All for as much as 40% less per month than you're paying now.

**Us.** Anybody who says they can do all this is worth talking to. Call Ron Doiron at (714) 778-4800. Or write him in care of General Automation, Inc., 1055 S. East St., Anaheim, Calif. 92805.

## GENERAL AUTOMATION 18/30 DMS

See DMS in Booth 2201 at the National Computer Conference

# The alacrityous Univac DCT-500

Again available on short notice. We've more than doubled production on our fast-selling UNIVAC® DCT-500 Data Communication Terminal.

Here are some reasons why the UNIVAC DCT-500 is industry's most wanted hard copy terminal: 30 cps, 132 print positions, computer quality printout, up to 6-part forms.

And along with the UNIVAC DCT-500 you get Sperry Univac support and reliability.

Whatever your data communications requirements, check first with the Sperry Univac Communications and Terminals representative in your area, or call free 800-453-5323.

UNIVAC DCT-500 Data Communication Terminal

**SPERRY UNIVAC**

Only when our customers succeed do we succeed.

## Also Hard Copy

# Tektronix Adds CRT Unit

BEAVERTON, Ore. — Tektronix has introduced a CRT terminal and hard-copy unit to its line of displays. The 4023 adds a video display to the firm's earlier storage tube devices.

The 4023 has a capacity of 1,920 characters (24 lines, 80 char./line) on a 12 in. screen.

Editing features include insert character and line, delete character and line, replace, erase to end, erase input and erase page. There are also tab, back tab and repeating character keys.

Forms can be "ruled" with an optional package that draws solid horizontal and vertical lines. Visual field formats include inverted field, blinking field, blanked field, reverse field, blinking reverse field and dim field.

Logical formats include transmit, non-transmit, protected, non-protected and numeric only.

The Tektronix 4023 is priced at \$2,995 or \$98/mo including maintenance.

## Hard Copy

The 4632 hard-copy unit can be interfaced with the 4023, as well as Hazeltine, Sanders, IBM 3270 and other similar display terminals. The 4632 is priced at \$2,950 or \$98/mo and will be available for first deliveries in October.

First deliveries of the 4023 CRT are scheduled for July. The firm is at Box 500, 97005.

## AUERBACH Publishers Announces a monumental achievement: Martin L. Rubin's "Handbook of Data Processing Management"

Years in the making, Handbook of Data Processing Management is a compendium embracing every stage of this difficult art—from the first conception of a system to preliminary analysis, system design, programming, documentation, installation, operation and, finally, cessation.

In six profusely illustrated volumes, Martin L. Rubin, who designed the information systems for many of America's corporate giants, has set forth the knowledge and techniques acquired during a decade of EDP consulting. But Mr. Rubin was not satisfied merely to use his knowledge alone. He added the expertise of 46 eminent contributors from business and government.

As a result, Handbook of Data Processing Management is the most useful, most valuable reference work ever

The forms in Volumes II and III alone would cost hundreds of thousands of dollars if you had to originate them yourself.

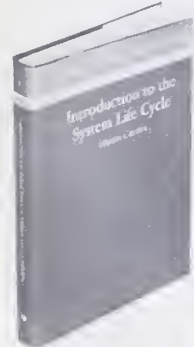


created for the EDP executive. The forms in Volumes II and III alone would cost hundreds of thousands of dollars if you had to originate them yourself.

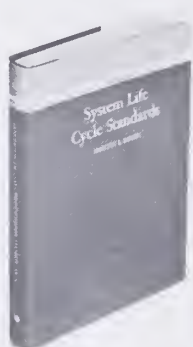
If you are one of the many EDP executives who have been waiting for a really definitive, really professional approach to the entire systems spectrum, wait no longer. Handbook of Data Processing Management is it.

You can order volumes individually. Or you can order the entire set and save 25%. Either way, you'll have 30 days to look over the material. See the coupon for details.

6 VOLUMES ☐ OVER 800 ILLUSTRATIONS  
THE MOST DEFINITIVE WORK EVER UNDERTAKEN IN THIS FIELD



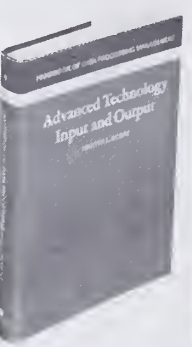
**VOLUME I**  
Introduction to System Life Cycle  
1. Explanation of the System Life Cycle  
2. Preliminary Analysis  
3. System Design  
4. Programming  
5. Documentation  
6. System Installation  
7. System Operation  
**Price: \$19.95**



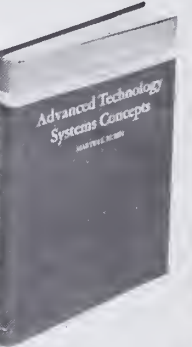
**VOLUME II**  
System Life Cycle Standards  
1. Project Management  
2. Preliminary Analysis—Investigation  
3. Preliminary Analysis—Systems Proposal  
4. Preliminary Analysis—Evaluation  
5. Systems Design—Detailed Analysis  
6. Systems Design—Specifications  
7. Programming  
8. System Documentation  
9. System Installation (Operational Phase In)  
10. Operation  
**Price: \$32.50**



**VOLUME III**  
System Life Cycle Standards—Forms Method  
1. General Instructions for the SLC Standards—Forms Method  
2. Preliminary Analysis—Specifications  
3. System Design Specifications  
4. General Documentation  
5. Program Documentation  
6. Operations Documentation  
7. User Documentation  
**Price: \$ 32.50**



**VOLUME IV**  
Advanced Technology—Input and Output  
1. Source Data Automation  
2. Keytape Devices  
3. Optical Character Recognition Devices  
4. Voice Response Systems  
5. Digital Plotters  
6. Display Devices  
**Price: \$32.50**



**VOLUME V**  
Advanced Technology—Systems Concepts  
1. Data Transmission  
2. Online Systems  
3. Data Base Concepts and Considerations  
4. Machine Self-Management  
5. Management Info Systems  
6. Computer Models and Planning  
7. Cybernetics and Data Processing  
**Price: \$ 32.50**



**VOLUME VI**  
Data Processing Administration  
1. Data Processing Organization  
2. Data Processing Personnel Policy  
3. Data Processing Education  
4. Legal Considerations in Data Processing  
5. Acquisition of Computer Power  
6. Management of the System Life Cycle Stages  
7. Project Management Methods  
8. Data Processing Budget and Cost Control  
9. Data Processing Management Audits  
**Price: \$32.50**

Gentlemen: Please send me the following Volume or volumes of Handbook of Data Processing Management. I understand that I may review this material for 30 days, and, if not entirely satisfied, return to you with no obligation.

Cost of 6-volumes set if purchased individually \$182.45

If ordered now, as complete set—\$140.00\*

\*A savings of over 25%

|                                           |          |
|-------------------------------------------|----------|
| <input type="checkbox"/> Volume 1         | \$ 19.95 |
| <input type="checkbox"/> Volume 2         | 32.50    |
| <input type="checkbox"/> Volume 3         | 32.50    |
| <input type="checkbox"/> Volume 4         | 32.50    |
| <input type="checkbox"/> Volume 5         | 32.50    |
| <input type="checkbox"/> Volume 6         | 32.50    |
| —Complete set, billed as shipped—\$140.00 |          |

30-day free approval offer

To: **COMPUTERWORLD, INC.**  
797 Washington St.  
Newton, Mass. 02160

NAME \_\_\_\_\_

TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

☐ I enclose payment ☐ Bill my company

## CDC Multistation Has Printer/CRTs At Remote Sites

MINNEAPOLIS, Minn. — Control Data has introduced 714 multistation terminal systems for users who need multiple display/printer capability. The systems are designed for communications line efficiency at remote sites.

The multistation configurations use the 714-122 display which handles eight lines of 80 characters or the larger 714-123 which displays 16 lines of 80 characters. Both displays offer either 63 or 96 Ascii characters.

The multistation systems offer two types of printers, the 711-120 non-impact unit for desk-top use and the 711-121 impact printer which handles up to six copies. Both printers operate at 30 char./sec.

Two controllers are available. The 714-10 is designed for sites with minimal printout requirements while the 714-20 multibuffer controller handles up to seven printers simultaneously.

A 714 system can be configured with up to 15 printers and/or displays on one controller. A typical configuration of five displays, two non-impact and one impact printer will cost from \$30,810 to \$34,810 depending on equipment. One year lease prices for the same configuration without maintenance will range from \$810/mo to \$903/mo. First deliveries are scheduled for the fourth quarter of 1973.

## User Gets 'Addicted' To Teletypewriters

KANSAS CITY, Mo. — In setting up communications capabilities, users should plan for expansion, because once the capability is available, people become "addicted" to the system and want more, panelists at a communications session of Computer Caravan/73 agreed.

Dave Nordlund of the University of Kansas noted that after a professor has had a teletypewriter in his office for about four months, he "can't possibly live without it, and wants five more."

One has to begin with the basics, but good planning can avoid making expansion a "traumatic experience," he said.

Frequently, new applications require different facilities, warned Don Class of the Kansas City Police Department.

Users should take a careful look at "how to divide terminals on lines," Class cautioned. "It's very easy to overload a line and then you have to pay an installation charge."

He said his department has always underestimated demand. "Show the users something and they want double that amount," he said.

## Bits & Pieces

### Varian Printer/Plotters Attach to CDC Computers

IRVINE, Calif. — Varian Data Machines has announced an interface which can connect its Statos 3110 or 3111 printer/plotter to any CDC 3000, 6000 or 7000 series computer.

Varian said the interface plugs into standard CDC data channel cables. It has I/O that mates with the I/O connector on the Statos unit.

Statos is an electrostatic printer/plotter capable of 1,000 line/min.

The interface sells for \$12,000. Delivery is 30 days from 2722 Michelson Drive, 92664.

### Calculators Have Program Memories

LOS ANGELES — Computer Design Corp. has extended its line of portable microcomputers with two scratchpad calculators which each feature two, 80-step program memories.

The hand-held models are the 324 Scientist and the 344 Statistician.

The units are battery operated, have multiple storage registers, and calculate to 13 digits. The Scientist features mathematical and trigonometric function keys while the Statistician offers statistical operations.

Deliveries of the \$895 Scientist and the \$1,095 Statistician are scheduled to begin in April.

Computer Design is at 12401 W. Olympic Blvd., 90064.

### Microfiche Unit Makes Multicopies

NORTH BERGEN, N.J. — Automated, programmed, multiple-copy printback from microfiche is possible with the Three/Four Enlarger/Printer, according to a spokesman for Cradco, Inc.

The Three/Four produces printout from NMA or Cosati format microfiche and will accept certain aperture card and jacket formats, he said.

Working from either a 98-image or 60-image fiche, users can make from one to 10 8-1/2 in. by 11 in. prints in succession from each fiche image.

Average cost per copy has been set at 2 cents for 8-1/2 in. by 11 in. copies and 4 cents for the 11 in. by 17 in. copies.

Cradco is located at 4100 West Side Ave., 07047.

### Viewer Has 1,000-Hr Life

MOUNTAIN VIEW, Calif. — Quantor Corp. has a 3/4-size microfiche viewer with a 1,000-hour lamp life.

This extended lamp life is about eight times longer than lamps in currently available viewers, the firm's spokesman asserted.

The Quantor 305 costs \$169 from 520 Logue Ave., 94040.

## Good Support Cited

# First MRX-40 Replaces IBM 360/20

By Ronald A. Frank  
Of the CW Staff

MAHWAH, N.J. — A northern New Jersey service bureau for public schools has a 48K CPU with 60M bytes of on-line disk storage. The machine looks very much like an IBM system but it is one of the first Memorex MRX-40 systems.

Educational Reading Service Inc. has had the MRX-40 since late last year. It was running a Model 20 from IBM but more capacity was required, according to Paul Bultmeyer, vice-president.

IBM proposed a System/3 and the user also considered a Model 30 on third-party lease, in addition to a 370/115 and 125. But the MRX was more cost-effective Bultmeyer said. The larger capacity MRX-40 costs about \$5,000/mo.

Although there have been some start-up problems with the system, the user said he is satisfied with its performance. Among the initial operating problems was a jamming condition with the Memorex printer. But field personnel installed a tension device on the unit and it now operates better in many respects than the IBM 1403, Bultmeyer said. One of the features that appeals to him is the crisper type font, he added.

Educational Reading was using IBM's Basic Programming Support (BPS) operating system on the Model 20 and conversion to the MRX/OS operating system was accomplished with a converter program supplied by Memorex.

The converter took the IBM-compatible RPG source decks, and produced an MRX-compatible card deck which could then be assembled on the new CPU, Bultmeyer explained.

### Some Software Difficulties

As with any new system, some software problems did crop up. Educational Reading had a software system that generated blanks in some records, but the Memorex RPG did not recognize the blanks and zeros had to be generated into these records, he said.

But despite the start-up problems, Bultmeyer said Memorex gave him around-the-clock support that he described as being at least as good as the service available from IBM.

Although the Memorex machine appears to have faster throughput, exact comparisons are difficult. One of the biggest advantages is the increased available on-line disk storage, according to Bultmeyer. The Model 20 handled 2311-type disks while the MRX 40 runs with larger 2314 disks, he said. The 20 had a total disk capacity of 10M bytes while the Memorex system can handle up to 90M bytes.

Another advantage of the Memorex system is its capability to run dual partitions. Educational Reading expects to have a new output spooling package from Memorex within six weeks. This could double throughput when combined with

the additional 30M bytes of storage that he has ordered, Bultmeyer said.

With the dual partition operation, the user may later add on-line communications. And a Memorex computer-output-microfilm system could be added to the printer channel to cut output jobs by 90%, Bultmeyer said.

Educational Reading services public schools with accounting, library circulation records, report cards, attendance summaries and other administrative DP support.

Bultmeyer acknowledges that being a pioneer of the MRX-40 has created some difficulties. At present his software is about 80% converted to the new system. But he said the conversion and hardware support has "really impressed" him, and for future mainframe upgrades he would seriously consider a larger MRX-50.

## Computerized Publishing System Merges Text With Illustrations

BURBANK, Calif. — A modified micro-publishing system developed at Lockheed Aircraft Corp. to meet its technical publications needs, has the ability to merge optical illustrations stored on conventional photographic negatives with digitized text.

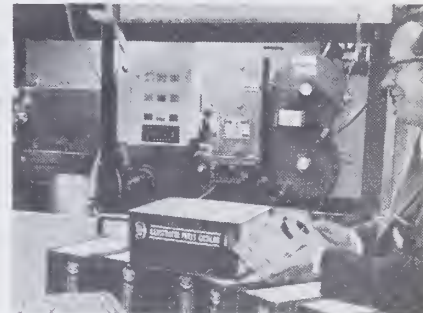
"Most computerized publishing systems store both the text and the illustrations in digitized form on magnetic tape," said Ralph Flygare, a Lockheed spokesman. "Storing illustrations in digitized form requires a large number of tapes and is really a costly approach."

"To save on tapes and expense, the resolution of the illustrations is reduced, resulting in poor quality illustrations. The use of photographic negatives eliminates poor quality and saves on expenses," he said.

A computer code keys the photographic negatives into the system, and the Form

Slide, a mechanical handler, accesses the photographic negatives when the code calls for them.

A modified computer-output-microfilm machine then allows the movie camera, which normally takes pictures of what is presented to it on a CRT display, to flash the negative through a two-way viewer.



Charles Voorhees, inventor of the Lockheed system, enters text into the machine via magnetic tape which is then presented to a motion picture camera on a CRT.

Lockheed developed the system over a four-year period, using teletypewriter input for the data and handling the system on its 360/65 with 512K memory.

Programs for the computerized publishing system are written in Cobol.

Lockheed has licensed Database, a division of Media Images Corp., Los Angeles, Calif., to service other publishers or to install the system on either a lease or a walk-away basis.

A spokesman for Database estimated that for a user who already has a central computer, installation costs for the system would run from \$250,000 to \$500,000.

Database is located at 3435 Wilshire Blvd., Los Angeles, 90005.

## S/3 Add-On '25% Off IBM Price'

ORANGE, Calif. — IBM System/3 users can obtain a core memory add-on at a "minimum cost savings of 25% compared to core memory from IBM," according to a spokesman for Business Systems Technology, Inc. (BST).

The BST/3 can be used either as an add-on or replacement memory for IBM-supplied memory above the basic 8K bytes initially provided with the System/3.

The memory is housed in a 6 in. by 18 in. by 24 in. enclosure which contains the power supply and up to 64K bytes in increments of 8K and 16K bytes. Optionally, the memory can be connected to the system by a cable up to 10 feet long.

Performance, according to the firm, is identical to that of IBM System/3 memory. Further, all diagnostics and system software are the same, meaning that no user program changes are required, the spokesman added.

Installation is promised in "approximately two hours" and complete maintenance provided by BST is included in the rental price.

Plans are available to users to lease or purchase the BST/3. In the case of purchased memories, maintenance contracts are available.

BST is located at 747 West Katella, 92667.

## IT TAKES A SMART DP MANAGER TO PICK AN INTELLIGENT TERMINAL.

And the reason is surprisingly simple.

Once you lease a communications terminal for a specific job, you'll be asked to use it for other applications, as well.

Preparing the payroll, taking inventory—that kind of thing.

Our intelligent Sycor 340 has 8K bytes of programmable memory that gives you the flexibility to accept those additional tasks. Simple, non-intelligent terminals don't.

With them, what you lease is what you get. And there are other reasons to choose our 340.

Like an additional 8K bytes of firmware to get you started right away.

Like sophisticated binary synchronous communications procedures to catch transmission errors and retransmit data automatically.

The advantage of unattended communications. To let you send, process and receive data overnight.

And a wide choice of peripheral equipment, including a selection of printers from 30 cps to 300 lpm.

So before you lease a terminal, check with Sycor. We already have more than 6,000 intelligent terminals in use in 33 countries.

You'll see why the smart money's on Sycor.

**SYCOR**

Corporate Offices: Ann Arbor, Michigan 48104 (313) 971-0900

### The SYCOR 340 Intelligent Communications Terminal



**S**  
SYCOR INC.

DISTRICT  
SALES  
OFFICES:

Atlanta  
Boston  
Chicago  
Cleveland  
Dallas  
Detroit  
Houston  
Los Angeles  
New York  
Philadelphia  
Pittsburgh  
San Francisco  
Toronto  
Washington

Service Centers in 76 cities

2260 **DUCS** 3270

We are pleased to announce the availability of DUCS-V (Display Unit Control System - Version 5). DUCS-V will concurrently support both the IBM 2260 Display Unit as well as the IBM 3270 Display Station in a local environment. The 3270 Display Stations are simulated in 2260 mode with no alteration necessary to the user's programs. The basic DUCS-V Program (2260 support only) is a licensed program product available from C F S, INC. for a monthly lease fee of \$25.00. The DUCS-V 3270 simulator feature is also a licensed program product available for an additional \$15.00 per month. The 3270 Simulator may be added to any DUCS-V System subsequent to the initial installation of DUCS-V without user re-assembly or linkage editing.

DUCS-VI will be available during the 3rd quarter of 1973. Version 6 will support both local and remote IBM 3270 Display Systems providing users with a convenient means of utilizing the enhancements of the IBM 3270 System.

Requests for DUCS-V should be submitted to C F S. License agreements, DUCS-V abstracts and other details will be sent by return mail. Inquiries may be directed to Mr. Richard K. Goran.



CFS, INC. POST OFFICE BOX 662  
BROOKLINE, MASS. 02147 (617) 731-3474

## Quantor COMMon Sense in Service Bureaus



Quantor COM  
is top drawer at  
NCR's domestic service bureaus.

**Quantor**

570 Logue Avenue, Mountain View, California 94040 (415) 965-3700  
Oak Brook (Chicago) (312) 654-3720 New York, N.Y. (212) 279-3280  
Washington, D.C. (703) 960-3707 Los Angeles, Calif. (714) 833-0157  
Miami, Fla. (305) 448-3650 Atlanta, Ga. (404) 237-1176  
Houston, Texas (713) 772-1772 Philadelphia, Pa. (215) 643-2250

## 'Cheaper and Better'

# University Building Computer

PITTSBURGH, Pa. — A professor and his students at Carnegie-Mellon University are building a general-purpose computer that they say is "sixteen times more powerful than most computers available today, and should be one-fifth to 1/10 the cost of those few which are as powerful."

Known as the Carnegie-Mellon Multi-Mini-Processor the computer is actually a coordinated group of 16 PDP-11-based mini-computers, each with its own memory box, but capable of sharing memory with the other units.

The smaller units linked together are much less expensive than the big machines which would be needed to perform comparable work, Dr. William Wulf said, because "the major cost of building computers today is the hardware — the frame, switches, power supply — not the electronics."

The PDP-11s were purchased for the project because buying them was cheaper than making them, Wulf added. Most other parts of the processor-complex were built by students and university staff.

One of the most complicated jobs was devising a master switch to control access to the various memory boxes, Wulf asserted.

The switch routes a problem to the appropriate memory box, and in cases of conflict, insures that only one processing unit can address a memory box at a time. However, the switch allows independent access to other memory boxes at the same time.

Wulf feels his computer is superior to standard machines which he defines as uniprocessors because they can perform only one function at a time and handle a job by doing various steps in sequence.

Because these uniprocessors can only work on one portion of a job at a time, Wulf said, "there are a number of bigger problems that we cannot do on them."

### Real-Time Speech

One example he cited is real-time speech understanding, a task to which the processor-complex will be applied.

"To understand a limited vocabulary, computers now take 10 to 20 times real time. In other words, the time it takes the computer to understand a spoken word is 10 to 20 times longer than it takes to say it."

"If we can reduce this time with our multi-mini-processor then we'll be able to talk to the machine to give it commands."

Another application cited as ideal for the computer-complex approach is better weather forecasting and radar flight control.

Wulf said a single "uniprocessor" takes about 36 hours to sift through the data needed to produce a 24-hour national weather forecast, thus making the forecast obsolete before it is completed.

The students also developed their own compiler called Pliss.

With Wulf and the students into the second year of their efforts, he sums up the present situation by stating, "We have a small version of the hardware



Professor William A. Wulf holds a printed circuit board and over-looks plans for other boards going into the university-built computer.

working and the major compiler is essentially finished. Work is continuing to build the full-scale computer and iron out any remaining bugs in the system."

## Programmable Word Processor Uses Cassettes

NORTH BILLERICA, Mass. — The Linolex/WP from Linolex Systems Inc. is a text preparation and word processing system built around a programmable microprocessor.

System components include a video display screen, typewriter keyboard and three digital cassettes.

The cassettes serve two functions: storing text typed by the operator and storing programs that allow the typist to edit and perform various automatic operations such as underlining.

The word processing system is capable of handling a variety of output devices including a 30 char./sec printer, IBM Selectric, or 165 char./sec matrix printer. An optional feature allows simultaneous creation or editing of one document while another is being printed.

A communications attachment permits the unit to serve as transmission system or terminal to another computer.

Price of the Linolex/Word Processor is \$17,900 from 5 Esquire Road, 01862.

## Modular Medical System Based on HP2100 Mini

WALTHAM, Mass. — Monitoring critically-ill patients, calculating and analyzing single or bi-plane angiograms, interpreting ECGs, and measuring and displaying forced vital capacity functions and respiratory parameters can all be done by Hewlett-Packard's Medically-Oriented Data System (Mods) for cardio-pulmonary applications.

The system is based on the HP2100 minicomputer using HP Real-Time Executive software which features multi-programming capability with priority scheduling. The use of terminals stations, such as the Cardiac Catheterization Labora-

tory Station, for collecting and displaying data gives the system modular flexibility, Hewlett-Packard said, allowing customization and gradual upgrade. Mods could eventually be interfaced to a Medical Information Network, the firm added.

The cost of the basic system, the HP2100 with the Executive Software is in the range of \$70,000. Each station/function terminal with the software needed runs \$15,000 to \$20,000. Other peripherals are additional.

The Medical Electronics Division of Hewlett-Packard is at 175 Wyman St., 02154.

## New Term Lease Plan



**alanthus**

- Four Year Term
- Two Year Termination
- Full ITC to lessee
- New or installed systems
- Guaranteed savings on upgrades
- We will purchase customer owned 370's
- Plus unmatched 7 & 8 year financial leases

# First-Time User Suggests Go Slow, Maintain Control

NEW YORK — The guiding principles for small businesses with their first computers are to go slow and maintain management involvement, according to Edwin Stalzer of Karlana Knitwear Ltd.

"I had no idea how computers worked, but decided we would have to be responsible for deciding on such a large invest-

ment," Stalzer, vice-president and treasurer, said.

With the principle of self-responsibility, Stalzer began looking at different computers and trying to learn what the selection parameters should be.

"Initially, the two main considerations

were cost and simplicity of operation.

But soon support became paramount. If we were going to 'go it alone' we needed support, especially in the start-up period.

"Thus, even though IBM was more costly than other options, the local sales force and support personnel impressed us and the decision was made to order an IBM System/3 Model 10."

"It was important to me that we wrote our own software because we knew what information the company could use. If you use a canned package, sometimes you find yourself coming to conclusions based on reports that are almost but not quite what you want," he said.

From the initial programs, the company started to expand to more applications. At the same time, Stalzer discovered an unforeseen problem.

The problem was recognizing that the computer was only a tool.

"It was very easy to get caught up in the computer's operation. When we wrote the first few applications, we were here to all hours of the night and became emotionally involved in the operation. When they would work, it was a personal triumph, when they failed we felt it a personal affront," he said.

"But we forced ourselves to be patient and to go slow. Each operation had to be complete before we went on to the next," he explained.

## Hospital Writes Its Own Software

FAYETTEVILLE, Ark. — A small computer system using software written mostly by internal personnel is being used to keep Washington General Hospital's inventory costs under control.

As pressure builds to account for dollar expenditures, Washington General has felt it necessary to maintain effective levels and develop better controls of actual stocks.

The key to effective control, according to William Cooper, hospital controller, is a system that provides a close look at investments in general stores and strives to distribute costs more equitably among the departments using the various supplies, equipment and machinery.

Before the computer application, these efforts were bottlenecked in a somewhat hit-and-miss manual card file inventory system, he related.

A new computerized system was written for the hospital's small computer that covers approximately 3,500 items in general stores.

The Perpetual Inventory Control (PIC) was developed within Washington General's own DP department.

### Files Already There

One of the earlier applications, general ledger, tied in closely with the new PIC system because the general ledger files maintained by the computer were already set up to maintain costs by department.

Under the new system, computer control was established for each purchase order written by the hospital's purchasing department. For each item purchased, the orders indicate whether the articles will be maintained in general stores inventory or identify the operating department that will take immediate delivery.

After orders are issued, information on the purchased items is punched into cards and entered into disk files maintained by the computer. The NCR Century 100 has two interchangeable disk packs with a total capacity of 8.4M characters.

The computer can interrelate data from these files for processing purposes and to produce analytical reports. Thus, for example, information on open purchase orders can be included with data on stocks on hand for complete status reporting.

As purchased items are received at the hospital, packing slips are sent to the data processing department. From these, cards are punched which when processed by the computer will remove the items from the purchase order file and place them in a record for unpaid inventory. In this file, pricing is based on purchase order information, which includes estimates of costs which cannot be pinpointed, such as shipping charges.

This unpaid inventory file functions as a valuable accounting expedient, Cooper said. It makes it possible to deliver the articles to general stores or the using departments immediately.

This file shows the articles as being in stock in the hospital, but the unpaid file also acts as an accounting suspense file. Costs are carried on an estimated basis until they are known specifically. This facilitates implementation of an actual cost accounting system.

Costs can be allocated to proper accounts exactly when invoices are received. The actual books of account of the hospital carry no estimates or material cost variances.

When invoices are received, cards are

punched with actual costs. When these are processed, items are removed from the unpaid inventory file and allocated in one of two ways:

- Items being charged to specific departments are allocated to the appropriate general ledger cost accounts.

- Items being retained in general stores inventories are charged as actual costs to this inventory account. Then, when these items are issued from inventory stocks, they will be charged to the departments at average costs based on actual prices.

### The Small Systems User

The initial configuration consisted of the central processor with 8K bytes of core memory, a 300 line/min printer and punched card equipment.

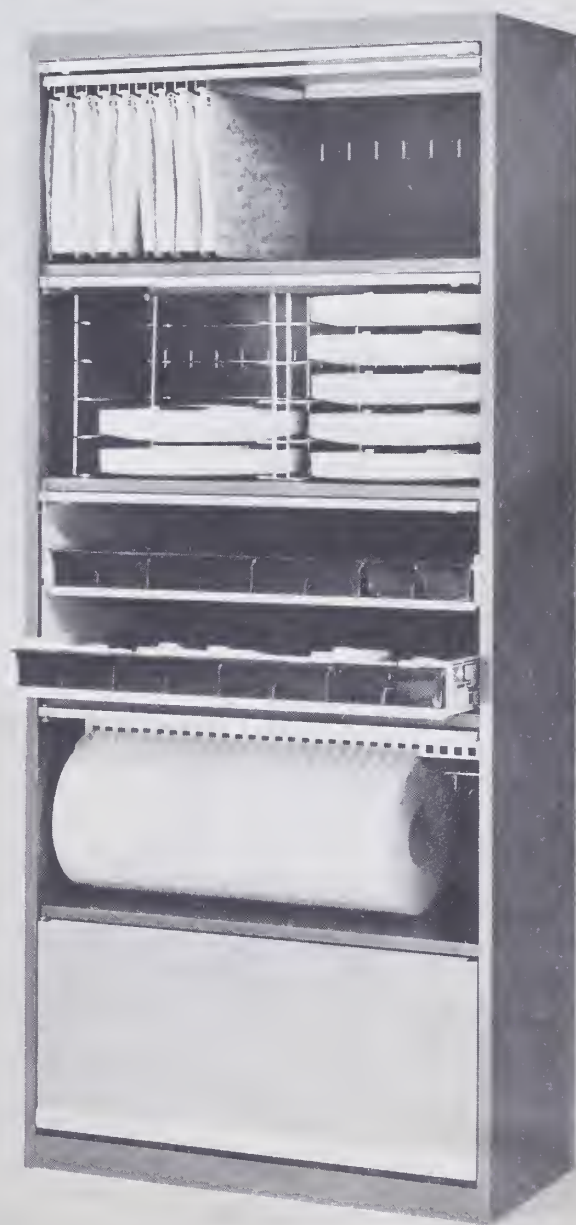
"I knew eventually I wanted to go to disk," he related, "but I did not want to make this move until I was sure that the company could handle what we had."

Stalzer started out with simple applications such as entering the number of sales for each style the company produced.

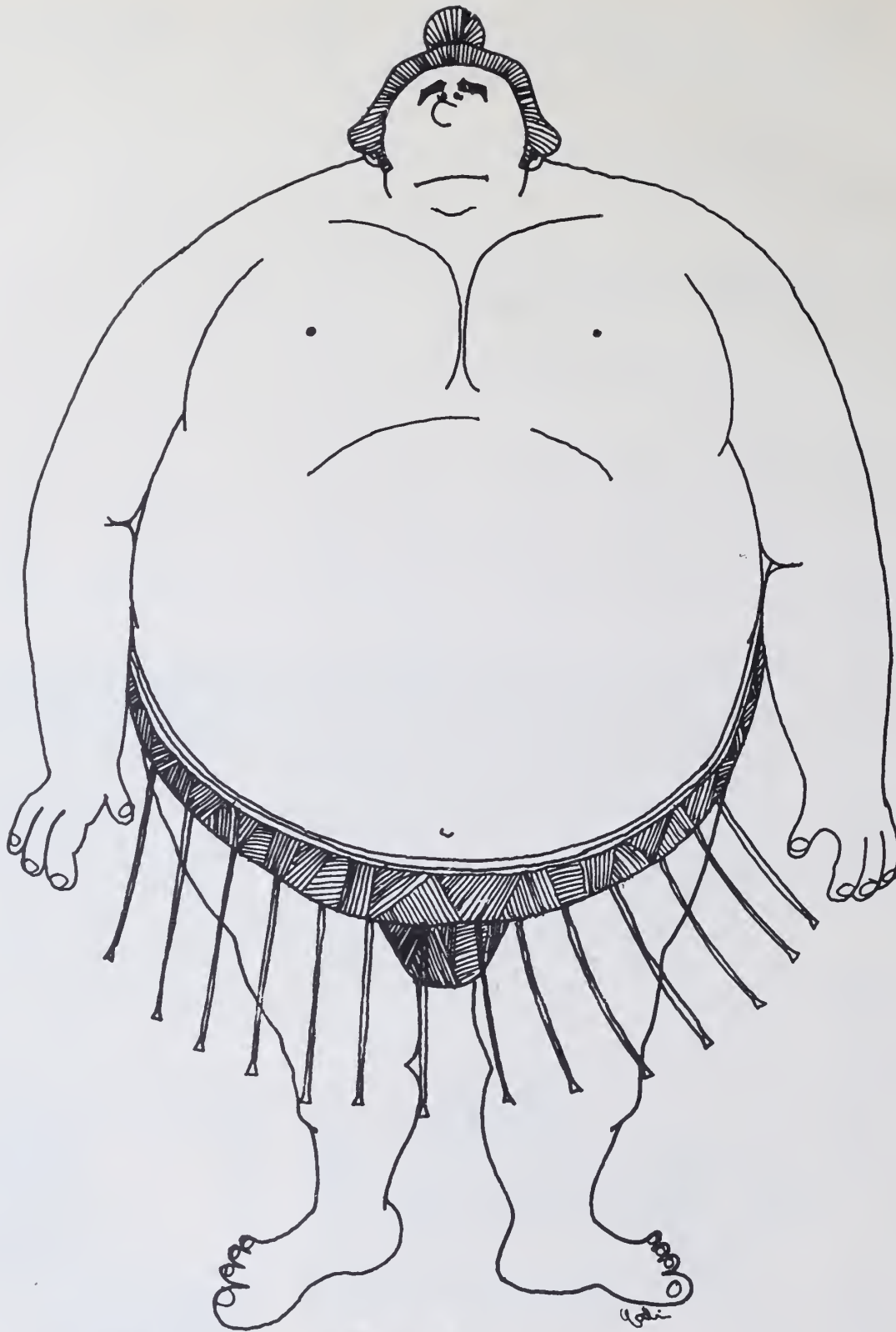
**Orderly, Safe Storage In Minimal Space** —that's proven Tab Data Media Cabinets. Versatility was born into these cabinets. They have been designed to accommodate hanging printout binders, disk packs and racked or hanging magnetic tape. They are even ideal for storing cards. Tab Data Media Cabinets can be ordered with roll-out shelves that bring data media right to your fingertips.

And, if storing miscellaneous office paraphernalia is a problem, forget it. Just tuck it away in the generously-sized Data Media compartments and close the stylish TrimLine doors. Neat. For complete information about Tab 2, 3, 4 and 5 high Data Media Cabinets, call your local Tab representative. Or, write Tab Products Company, 2690 Hanover Street, Palo Alto, California 94304.

## Tab System/3 Organizer



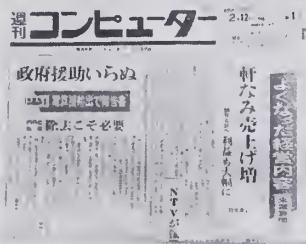
**TAB**  
PRODUCTS CO.



And in English, it means "Computer Weekly." Whatever you call it, *Computerworld's* new sister publication is an excellent vehicle for selling EDP products and services in the large and expanding Japanese EDP market. Here are some of the reasons why:

- **Shukan Computer** is a joint venture of *Computerworld* and Dempa Publications, the leading Japanese publisher of electronics information services. With the combined resources of the two companies, Shukan has the largest news gathering organization of its kind in the world.
- **Shukan Computer** is the only newsweekly for the fast-growing Japanese computer community.
- Initial circulation is guaranteed at 35,000, divided about 80% to end-users and 20% to the computer industry. Circulation development methods currently under way are the same as those which gave *Computerworld* the highest paid circulation in its field in less than four years.
- Shukan lets you in on the action in the world's fastest growing EDP market. The Japanese Ministry of International Trade and Industry (MITI) has made the following 1976 forecast: 39,000 general-purpose systems installed, up from 11,237 in 1971; 11,000 minicomputers installed, up from 1,670 in 1971; and 3,000 industrial systems installed, up from 1,086 in 1971.
- Is this growth likely? The latest census of general-purpose systems revealed that there were 14,806 systems installed as of September 1972, a one-year gain of 3,569

## New heavyweight in the Japanese Computer market:



**In Japanese,  
it's called  
Shukan Computer.**

units and \$911 million installed value, a growth of 31.7% and 23.1%, respectively. And more than 50% of these new systems were American made.

- It is true that there are import restrictions. But Japanese vendors and users can get permission to import almost anything they want and need. As a result, 1972 imports were over \$360 million.
- Advertising in Shukan is easy. With *Computerworld* representatives across the U.S. to assist you, it's easy to place space in Shukan. For a small fee, we can translate and type-set your ad from English to Japanese. To get more facts, just send in the coupon.

To: Neal Wilder, Vice President  
COMPUTERWORLD  
797 Washington Street  
Newton, Massachusetts 02160  
Please send me more information on *Shukan Computer* advertising.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

ZIP \_\_\_\_\_



**COMPUTERWORLD**

## CI Notes

### Univac Lands Army Award

WASHINGTON, D.C. — Univac has landed a contract valued at \$28.9 million from the General Services Administration, on behalf of the U.S. Army, to supply computers and peripheral equipment for the Army's message switching network.

Under the contract, Univac will supply 9400s and peripherals for 27 automated communications message processing systems comprising the Army's Automated Telecommunications Center.

### Telex-IBM Transcripts Available

ENCINO, Calif. — Wonder what's happening at the Telex/IBM trial, but haven't got time to sit through it? The Computer Industry Association has set up a copying and distribution service which supplies documents and/or transcripts filed in the case daily.

Transcripts are running about 200 pages each day and sell for 20 cent/page. Trial subscriptions are available and can include a choice of documents or transcripts or both. Copies of individual documents are not available. CIA is at 16255 Ventura Blvd, 91316.

### GTE to Build SSA Network

WHITE PLAINS, N.Y. — GTE Information Systems Inc. has landed a five-year, \$18 million contract from the Social Security Administration.

The award is for the development and installation of a nationwide data communications network for handling monthly security income payments.

### Inforex Gets Soviet Order

BURLINGTON, Mass. — Inforex has received an order valued at over \$300,000 for key-to-disk equipment from the Soviet Institute of Automation and Control Technology in Moscow.

The majority of the order is scheduled for second quarter 1973 delivery.

The sale is a result of a marketing agreement for Communist countries with Siemens AG of West Germany.

### Supershorts

Okidata Corp. has announced its first export to Japan of American-made peripherals: Applied Magnetics Corp. disk systems.

Sperry Remington has increased by \$546,505 its order for Redactron Corp. editing typewriter equipment to be delivered between August and December 1973.

Saab-Scania has signed a marketing agreement with Metrimex, the Hungarian Foreign Trade Organization. The pack designates Saab-Scania as a main supplier of DP equipment to Hungary and provides for cooperative ventures with Hungarian firms.

## 60% Replacements

# Report Shows Shipments Up 24% in '72

By Molly Upton  
Of the CW Staff

NEWTON, Mass. — Shipments by U.S.-based computer manufacturers grew almost 24% to reach \$8.9 billion in 1972, but a large part of the volume was attributable to replacement shipments, according to International Data Corp.'s *EDP Industry Report*.

Up to 60% of U.S. shipments in 1972 were for replacements, or as IBM calls the phenomenon, "discontinuances," the market research firm said. On a worldwide basis, replacements accounted for 50% of shipments, the report noted.

Although the large number of replacements boosts shipment levels, the report noted, the "cost of manufacturing is not offset by additional rentals.

"The customer benefits, but the manufacturer doesn't add nearly so much new revenue-producing capacity for his expended buck. And in massive doses, it hurts," the report said.

But the retirements phenomenon has peaked, and IDC projected it will decline to about 40% of shipments by the end of 1973, and hold relatively even in the range of 35% to 40% of shipments during the next five years.

### Revenues Rose

Revenues of U.S.-based computer manufacturers rose almost 17% during the year to \$14.5 billion, which is a large improvement from the 10% growth recorded in 1969, '70 and '71, although still below the 30% days of the late sixties, the report observed.

IDC looks for the revenue growth rate to continue, as users begin budgeting for long-range teleprocessing applications.

Total revenues of U.S.-based firms could double to \$28.6 billion by 1977, with the impetus from the trend to teleprocessing, the report said.

Revenues to U.S.-based firms from general-purpose computers will almost double by 1977, from \$9.7 billion in 1972 to \$18.4 billion, while revenues from dedicated computers will triple, going from \$560 million to \$1.7 billion in 1977, IDC said.

Revenues from independent peripherals, based on shipments rather than OEM sales, are projected to more than double, from \$780 million to \$1.75 billion, according to the firm.

In the DP supplies section, revenues will grow from \$1.2 billion in 1972 to \$1.8 billion in 1977, IDC said.

Batch and on-line services are expected to leap from \$1.8 billion in 1972 to \$4.1 billion in 1977, while contract and packaged software revenues are expected to grow from \$410 million to \$860 million over the next five years, according to the report.

### IBM Share Declines

Although IBM led, as usual, in world-

wide shipments among U.S.-based manufacturers, its market share declined, according to IDC.

IBM accounted for 65.2% of 1972 shipments, or \$5.8 billion, holding a 63.5% share of the installed base at year-end 1972, for a total of \$28.5 billion.

During 1972, the industry averaged a 10% increase in its installed base, whereas IBM's 1972 rise in installed base was only 6%, IDC said.

In addition, a \$380 million buying splurge by third-party lessors of IBM 370s helped decrease IBM's U.S. rental vs. sales base to the 50% level, down 5% from last year, the report noted.

The plug-compatible segment of the market shipped \$410 million in equipment, or 4.6% of total shipments during the year, and showed a 33% increase in installed base by the end of 1972. This sector now has installed equipment valued at \$1.2 billion, or 2.6% of the \$44.8 billion total, IDC said.

### How Others Fared

Honeywell shipments, valued at \$745 million, accounted for 8.4% of the total 1972 shipments by U.S.-based manufacturers.

With a 14% rise in its installed base over 1971, HIS had \$4.5 billion of equipment in use, or 10% of the total installed base, the report said.

Univac/RCA placed third in terms of installed worldwide base, IDC said, having shipped \$485 million or 5.5% of total shipments. The installed base totaled \$3.4 billion at year-end or 7.6% of the total, showing a 7% rise over the firm's 1971 position.

Burroughs shipped \$425 million of equipment, accounting for 4.8% of shipments, and at year-end 1972 held 4.5% or \$2 billion of the installed base, which is a 15% rise over its 1971 position, according to IDC.

Control Data Corp. accounted for 2.9% of total shipments, for \$255 million and held 4.2% or \$1.8 billion of the base, also showing a 15% gain from last year's base, the report said.

NCR had 2.4% of the total installed base, and showed shipments of \$215 million or 2.4% of the year's shipments.

Digital Equipment Corp. scored a 46% change in its installed base during the year, IDC said, with 1.5% of the total base by year-end 1972 or \$690 million.

Shipments by DEC during the year totaled \$195 million or 2.2% of the total.

Others, which includes mini-makers, shipped \$300 million during the year, accounting for 3.4% of total shipments. Their market share totaled 3.7%, an increase of 25%, for a total base of \$1.6 billion, according to the report.

## European Terminal Market Ripe For Rapid Growth, Study Finds

LONDON — The number of terminals installed in Europe in the next four years will show a sharp upward trend, according to a report prepared by Logica Ltd., a British market research firm.

By 1977, there will be more than 300,000 general-purpose terminals in use in Western Europe, almost four times the number installed now. In Eastern Europe, the number will grow by a factor of nine, the report indicated.

The UK, Germany and France together account for 75% of the terminals now used on-line in Europe, according to the report entitled "The European Market for Computer Terminals 1973-1976."

The report cited the UK as having more terminals installed than any other European nation, but predicted the higher growth rates of France and Germany will have compensated for this by 1977.

The predominance of types of terminals vary from country to country, the report said. In the UK and France, there are about twice as many keyboard printers as CRTs, while in Germany there are more CRTs.

France has more remote-batch terminals than Germany, and the UK leads France and Germany in the use of accounting

and computing terminals, the study showed.

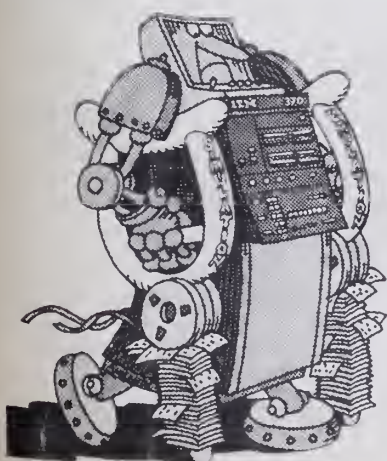
The report also investigated the preference of certain industry segments for types of terminals, and found that transportation, distribution and finance account for about half the CRTs installed in Europe.

These sectors, as well as service bureaus and central governments, use about half of the keyboard printers installed.

The independents seem to have more of a market in the area of keyboard printers than in CRTs, remote-batch and accounting terminals, the study indicated.

For example, only one-third of the keyboard printers installed in Europe are supplied by the mainframe computer manufacturers, while mainframers supply between two-thirds and three-quarters of the CRTs, remote-batch and accounting units in use.

The survey found the European market rebounding from the recent recession, with the present installation rate higher than was anticipated in 1971. However, it noted, the number of terminals installed is 10% less than had been forecast 18 months ago.



## 370 USERS, THROW AWAY YOUR CRUTCHES

You don't have to limp along on 1400 programs propped-up by expensive emulation and simulation. Save time, core and rent with INSCO/CS 1400 Translator. This unique proprietary system has already converted over 1000 programs from Object to COBOL. Typical results: 360/40 DOS with disk programs—35% time savings; 370/155 OS tape programs—3 times faster using 1/3 the core.

Besides these everyday savings, INSCO/CS Translator helps you get back the most on your original 1400 program investment. And it rescues your programmers from the drudgery of second generation languages.

Eventually you will have to face the problem. Why not get the facts now? Send today for our free brochure, "The Better Way" or call Bob Russo: 212 - 553-8544.

INSCO/CS Translator  
12 Gold Street  
Box 100  
New York, N.Y. 10038

- ☐ Send me "The Better Way"
- ☐ Prove it to me

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City, State & Zip \_\_\_\_\_

INSCO/CS

## Orders & Installations

The city of Baton Rouge, La., has ordered an NCR Century 251 multi-programming system for use in a law enforcement program and general accounting.

Gold Circle Discount Store, Danbury, Conn., has installed a Pitney Bowes-Alpex Spice electronic register system.

Foley's, a division of Federated Department Stores in Houston, Texas, has ordered 797 NCR 280 retail data terminals and associated equipment including three NCR 725 computers.

Engelhard Minerals & Chemicals Corp., Cherry Hill, N.J., has ordered a key-to-disk system from Logic Corp.

H.J. Wilson, catalog store chain, has installed 119 Pitney Bowes-Alpex Spice registers in its nine stores.

Tube Turns Corp., Louisville, Ky., has implemented a Data Technology Industries' Cobol compiler.

The National Shawmut Bank of Boston has purchased an Automated Tape Library Accounting System (Atlas) from GTE Data Services Inc.

St. Paul Computer Center, Baltimore, Md., has ordered a Univac 9480 for use in hospital patient accounting and other business operations.

The Lutheran Hospital Society of Southern California has ordered a Univac 1106 system to form the base of an information system serving seven affiliated hospitals.

Mohr Distributors, operators of Mohr-Value general merchandise stores in Missouri and Illinois, have ordered over 100 NCR 280 retail data terminals and 12 NCR 723 data collectors to convert all its stores to electronic point-of-sale terminals.

Lutheran Mutual Life Insurance Company, Waverly, Iowa, has purchased a TCC Life/70 total information service.

## Report Advises Banks to 'Go Slow' On Buying Automated Teller Units

NEW YORK — Banks have been advised to carefully evaluate the costs and benefits of automated teller (AT) systems, in a report issued by management consultants Coloney, Cannon, Main & Pursell, Inc. (CCMP) here.

The firm recommended delay and study by banks. It predicted that machine costs will likely decline by as much as 30% within two years; that second generation machines will make obsolete today's AT systems; security problems will be solved within the next few years; and regulatory constraints on using ATs off-premise may be relaxed.

Although manufacturers have estimated the automated teller market to reach the range of 10,000 to 100,000 units by 1980 with a value of from \$250 million to over \$1 billion, the report cautioned that "few banks will be able to justify automated tellers on economic grounds alone and a large majority may

not be able to justify them at all."

The firm called the automated teller marketing rationale "almost as hypnotic to bankers as to the manufacturers themselves."

### '320 New Customers'

CCMP estimated that "to cover the first year's operating cost of \$16,000 for one off-line automated teller unit, the unit would have to draw \$800,000 in deposits or about 320 new customers."

For banks installing numerous AT units, the report noted: "The first-year operating costs for 10 on-line machines — \$225,000 — roughly equals one fifth of net operating income for the average \$100 million bank and easily exceeds total annual operating costs of three average branches in rented quarters."

"Although prevailing opinion concerning ATs is both noisy and optimistic, we firmly believe it is largely unwarranted, at least for the next few years, and most banks that are lured into large-scale machine purchases will find that considerable risk accompanies the decision to buy," observed senior consultant Brooks T. Chamberlin.

### Need Answered?

"To date we have seen no firm (much less compelling) evidence that these machines actually answer a need, that the consumer population as a whole will accept them or use them enough to cover the substantial investment required to purchase and operate them," the report said.

However, the firm sees success for ATs used in selected situations such as providing services in areas that cannot support a full branch or in servicing specific customer groups such as travelers at airports or workers in industrial parks.

## Five British Firms Planning NCC Exhibits

NEW YORK — The British are coming — to the National Computer Conference (NCC) here June 4-8.

Five British firms, as well as the Business Equipment Trade Association, will be exhibiting at the Coliseum. The British exhibit is jointly sponsored by the trade group and the government Department of Trade and Industry.

The firms include: Altergo Ltd., Computer Cooperatives Ltd., Computer Technology Ltd., Mastertape (Magnetic) Ltd. and Process Peripherals.

The exhibit will feature data storage, visual display units, data transmission and other peripherals units.

"The British computer industry is now growing vigorously again and in an increasingly international environment expects to make serious sales in the U.S. market — particularly in specialist sectors of the market where Britain has some very competitive products to offer," a spokesman for the trade association commented.

## Study of Electronic Funds Transfer Systems Underway

CHICAGO — A study to determine the near-term business opportunities in Electronic Funds Transfer Systems (EFTS), supplemented by an examination of the end-user market and its impact on information systems suppliers, is being conducted by Booz, Allen & Hamilton.

"The ultimate success of the information systems market in EFTS is directly related to whether there is an end-user market for bank EFTS services," a spokesman said.

The study will investigate five areas: corporate funds transfer, consumer funds transfer, point of sale, preauthorized payment and direct payroll deposit.

# BEFORE YOU ORDER CICS

*Write or call for twenty  
excellent reasons why you should  
be a TASK/MASTER® user.*



**TASK/MASTER:**  
a proprietary product of  
turnkey systems inc.

one eleven east avenue, norwalk, connecticut 06851  
(203) 838-4581

Dennis G. Sisco — Marketing Manager



# TRYING TO REACH THE EDP MARKET?????

Selling computers?

Selling Supplies?

Marketing software packages?

Selling terminals?

COMPUTER '72 will provide you with leads . . . . accurate leads to where the computers are.

COMPUTERS '72 will tell you who has purchased fourth generation equipment; where Systems 3 installations have been made and what companies have installed scanners, digital display, key/tape, key disk and more.

COMPUTERS '72 is a series of seven separate directories covering the following geographic areas:

- Northern California
- Southern California
- Pacific Northwest (Wash., Oregon, Idaho, Utah, Nevada and Arizona)
- New York City
- New England
- New Jersey and Long Island
- Connecticut and Southern New York (not including NYC)

COMPUTERS '72 provides the name and address of the site, the person who buys, a site description and a telephone number, all in convenient paperback format.

Published by KLH Associates

- I have included my check ☐  
Or purchase order ☐  
For COMPUTERS '72 of  
Northern California ☐  
Southern California ☐  
Pacific Northwest ☐  
New York City ☐  
New England ☐  
New Jersey and Long Island ☐  
Connecticut and Southern New York ☐

- |                        |              |
|------------------------|--------------|
| 1 or 2 copies          | \$30/book    |
| 3,4,5 copies           | \$25/book    |
| 6 or more              | \$20/book    |
| 2 of same book         | \$25 each    |
| 3 or 4 of same book    | \$20 each    |
| 5 or more of same book | \$17.50 each |

(No directories mailed without check or purchase order)

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone No. \_\_\_\_\_

CW Associates  
P.O. Box 144  
Babson Park, Mass. 02157  
Tel. (617) 969-4640

Limited Copies Remaining — Order Now!!

## Univac Credited In Record Year At Sperry Rand

NEW YORK — The Univac Division was credited with playing a large role in helping Sperry Rand achieve record earnings and revenues for the year and quarter ended March 31.

"Sperry Univac computer systems continued as the largest and fastest growing source of revenues, income and new orders for Sperry," Chairman J. Paul Lyet said.

### Earnings Up 49%

For the year, Sperry Rand earnings rose 48% to \$90.1 million or \$2.62 a share compared with \$60.8 million or \$1.77 a share in 1972.

Revenues climbed 22% to \$2.2 billion from \$1.8 billion a year ago.

In the quarter, earnings reached \$29.2 million or 85 cents a share compared with a restated \$20 million or 58 cents a share in the year-ago period.

Revenues totaled \$635 million compared with \$549.8 million in the 1972 period.

Sperry's effort to maintain its position as a leading government supplier has paid off in accelerated levels of revenue, profits and orders including several recent large commercial-type computer contracts, Lyet said.

### New Orders

New orders for computer systems from domestic commercial customers increased almost 50%, the firm said, adding that Sperry Univac's worldwide installed computer base now exceeds \$5 billion.

Lyet also cited "significant improvements in the company's operations as well as broadly stronger demand for Sperry's product lines especially in the domestic and international commercial markets as being most responsible for the record results."

Strong performances were turned in by other product areas such as the New Holland agricultural equipment, Sperry Vickers fluid power systems, Sperry guidance and control systems, and Sperry Remington consumer products, the firm said.

## Decision Data Cuts Loss

HORSHAM, Pa. — Decision Data Corp., manufacturer of 80- and 96-column card equipment, continued to cut its losses in the first quarter ended March 3.

Loss for the period totaled \$396,000 or 13 cents a share compared with \$548,000 or 26 cents a share in the year-ago period. The loss in the immediately preceding period was \$570,000.

Revenues soared to \$3.4 million from \$117,000 a year ago.

Shipments were also up in the quarter to 1,080 units compared with 804 units in the preceding quarter.

## Fast Relief From Volume Printing Headaches!



Dread large volume or bulk printing jobs that overload your staff and computers?

Take the pressure off and still meet your deadlines with minimum expense and hassle.

Computer Services Corporation, Michigan's largest data processing firm, has up to 600 hours of uninterrupted print time to offer you each week. We can handle one-time crisis or repetitive projects because we have:

- Multiple IBM Third Generation Systems
- Flexible Letter-writing Software Package
- Multiple IBM 1403 offline printers
- Bursting, decollating, and complete mailing and distribution operations
- PLENTY OF EXPERIENCE AND KNOW-HOW TO GET YOUR JOB DONE FAST, ACCURATELY, AND EFFICIENTLY.
- 1600 BPI and 9 Track Tape Drives
- Variable length records, blocks and selective printing
- Upper and lower case printing

When the printing gets heavy, don't panic! CSC is a fast-acting remedy that's only a phone call away!

For complete information on our services, phone Ken Hill or Al Angell at 313 - 358 - 3852, or write on your letterhead to their attention at:

COMPUTER SERVICES CORPORATION  
23225 Northwestern Highway • Southfield, Michigan 48075

# NCC is not a protest group.


**COMPUTERWORLD**
**BEFORE**

Our May 30 Preview Issue  
B&W closes May 18.

**DURING**

Our June 6 Show Issue  
Color closes May 18.  
B&W closes May 25.

**AFTER**

Our June 13 Wrap-Up Issue  
Color closes May 25.  
B&W closes June 1.

Whether or not you're going to The National Computer Conference, *Computerworld's* last-minute, complete coverage of the new, consolidated show is must reading — including the latest information on the wide variety of new products which will be displayed. Only a weekly newspaper can give you such complete and up-to-date coverage. And *Computerworld* is the only newsweekly for the computer community.

## The National Computer Conference: We've got it covered.

For details, contact the nearest Computerworld Representative:

Boston  
Bob Ziegel  
(617) 332-5606

New York  
Don Fagan  
(212) 594-5644

Los Angeles  
Bob Byrne  
(213) 477-4208

San Francisco  
Bill Healey  
(415) 362-8547

or write to: Judy Milford, Computerworld, 797 Washington Street, Newton, Mass. 02160

## Position Announcements

### PROGRAMMERS/ANALYSTS

WACHOVIA BANK & TRUST CO., N.A.  
Winston-Salem, N.C. 27102

is seeking experienced COBOL and Assembler Language Programmers/Analysts, OS experience is desired. There is ample room for advancement, and fringe benefits are among the best in the industry. Salary will be commensurate with background and experience. Contact

Hampden D. Kenan, Vice President  
P.O. Box 3099

Winston-Salem, N.C. 27102  
for further information.

An Equal Opportunity Employer

### SOFTWARE PROGRAMMERS

### PROJECT LEADERS

### APPLICATIONS PROGRAMMERS

MIS PROGRAMMER — to develop generalized MIS systems. Experienced in assembly language and file structures, preferably on DEC system-10.

PROJECT LEADERS AND APPLICATIONS PROGRAMMERS — to develop business systems. Two or more years experience in COBOL or FORTRAN.

Send detailed resume to:

ON-LINE SYSTEMS, INC.  
Dept. 202

115 Evergreen Heights Drive  
Pittsburgh, Pennsylvania 15229

## MARKET ORIENTED SYSTEMS ANALYSTS

Our name, Scan-Optics, tells you our business . . . developing and marketing superior optical character recognition systems. We have a high performance, versatile, computer controlled, OCR system which has been sold to some of the most sophisticated major data processing users in the U.S. We are an unusually dynamic company, looking for unusually capable, dynamic innovative individuals.

Candidates for these positions should have experience in the areas of systems analysis, design and implementation. A thorough

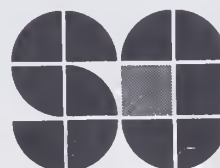
knowledge of programming, including assembly language is highly desirable.

Your responsibilities will include providing technical expertise within a sales and systems environment devising creative solutions to data input problems, and assisting our customers in the areas of OCR forms design, system design, and programming implementation.

We can offer you an unlimited opportunity for professional growth, and many more advantages.

Send your resume in confidence to D. Quinn.

Scan-Optics, Inc.  
22 Prestige Park Circle  
East Hartford, Ct. 06108



## M.I.T. Programming Consultant

M.I.T.'s Information Processing Center is seeking someone who has experience with large scale IBM 360 or 370 computers either as an applications programmer, systems programmer, or programming consultant. A thorough knowledge of JCL, FORTRAN, and other languages and documentation and communication skills are necessary qualifications.

This person would participate in the function of the computing center's User Services Group which include the following:

1. User Assistance — Assistance and consulting in programming information and debugging and tracking down special problems.
2. User Information — Documentation of manuals, conducting seminars and short courses on special subjects and special information searches.
3. Technical and Maintenance Support — Implementing and maintaining software items such as debugging compilers and plotting packages.

The User Services Group requires an individual who understands and is responsible to the needs of the center's users and who will work well with others in the multiple responsibilities of a university computing center.

Please send resume to  
M.I.T., Personnel Department  
77 Massachusetts Avenue  
Cambridge, MA. 02139  
An Equal Opportunity Employer

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

POSITION ANNOUNCEMENTS

## SYSTEMS PROGRAMMER

Departmental growth involving Telecommunications, System 370 and OS/VS1 has created an opening for Systems Programmer. Desirable background includes strong knowledge of Assembler language and JCL, with systems generation, system maintenance, and ANS COBOL experience helpful. Must have strong ability to debug, consult and assist application programmers.

## SYSTEMS ANALYST

Excellent opportunity for systems analyst experienced in conducting independent professional systems studies, and capable of supervising an analyst-programmer staff in a project oriented environment. Analyst will work on the design and implementation of various applications in a real-time teleprocessing environment. Degree required, programming background desirable.

Excellent fringe benefit program and working conditions. Salary commensurate with ability and experience. In reply, please give educational background, work experience and salary expected.

CW Box 3855  
60 Austin Street  
Newton, Mass. 02160

An Equal Opportunity Employer

## PROGRAMMER/ANALYSTS

It really doesn't matter  
where you work.

If you believed that, you wouldn't be reading recruiting ads.

If, on the other hand, you'd like to work with software professionals in an atmosphere of stability and opportunity, we want you to work for us.

Keane Associates is the largest software consulting firm in New England. We got that way by doing the tough jobs for users — like IMS, CICS, TP, RJE, PL/I, OS and the big new 360/370 applications that our clients want done.

We do it by hiring the right kind of people. The kind that know it does matter where you work. If that's you, write:

Judith Cyronak, Keane Associates, Inc.  
36 Washington Street  
Wellesley Hills, Mass. 02181

We want you to join us right now, and we have positions available in all of our branch offices.



KEANE ASSOCIATES, INC.

Boston Hartford Providence Worcester Westport  
Wellesley Philadelphia Detroit

An equal opportunity Employer M/F

## EDP PROFESSIONALS

Are you locked into your present position, unable to move? We have a real opportunity for an experienced insurance Data Administrator or Senior Systems Analyst equipped to accept the challenges of creativity and heavy responsibility.

To qualify, you must have knowledge of property and casualty insurance, data base design techniques, file residency and random access methodology, large scale integrated computer systems, and COBOL programming experience.

If you can meet those rigid qualifications, we want you to help establish, document, and maintain a Company data base resource system. Indianapolis location.

We invite you to call 317-923-6371, Lee Conolly, Employment Manager, or send resume for immediate confidential consideration.



MERIDIAN  
INSURANCE  
2955 North  
Meridian St.  
Indianapolis, Ind.  
46208

A Good Place to Work  
A Good Place to Insure



Bell Canada

## SENIOR SYSTEMS & DATA PROCESSING MANAGERS

Bell Canada, the largest user of computers in the Canadian private sector, has immediate openings in Montreal and Toronto for experienced systems and data processing managers.

### The Opportunities

Current openings exist at two levels of technical management.

The senior levels (Division Managers) are responsible for overall direction in a major area of specialization. Candidates must have 8-10 years experience which should include the direction of a technically-oriented staff.

The intermediate levels (District Managers) are responsible for the management of specific technical functions under the direction of a senior level manager.

Candidates must have at least 5 years experience and demonstrable competence in at least one area of specialization.

Major consideration will be given to candidates possessing in-depth experience in the design, implementation and operation of large-scale RJE, real-time and time-sharing systems.

### The Positions

#### APPLICATIONS DEVELOPMENT

Data Processing Systems Development: Division Manager; District Managers.

Programming Support: Division Manager; District Managers.

Clerical Systems Development: Division Manager; District Manager.

#### SOFTWARE DEVELOPMENT & HARDWARE PLANNING

Software Development: Division Manager; District Manager.

Hardware Planning: District Managers.

Data Communications: District Managers.

#### OPERATIONS

Data Centre Operations: Division Manager; District Managers.

#### SYSTEMS ADMINISTRATION

Systems Standards and Data Base Administration: Division Manager.

Systems Costs & Administration: District Manager.

Systems Education: Division Manager; District Managers.

### Salaries

Division Managers — to \$30,000

District Managers — to \$23,000

### Installed Equipment

The present installations include a variety of configurations of the following types:

IBM — 370/155, 360/65, 370/145,  
370/135, 360/30, 360/25, 360/20.

UNIVAC — 1108, III, 9200.

HONEYWELL — 6056, 400, 200.

CDC — 6400.

If you are interested in a challenging assignment in a dynamic professional environment, please send a résumé of your business experience and salary history in complete confidence to:

Bell Canada  
Corporate Systems Organization  
Mr. Hugh Pickering, District Manager,  
Manpower Recruitment & Development  
15th Floor, 1080 Beaver Hall Hill  
Montreal 128, Quebec

or call 514-871-1421.

## DATA PROCESSING MANAGEMENT CONSULTANT

New York  
Chicago  
Los Angeles

Most reputable and fastest growing executive search firm in nation whose volume has tripled in past 2 years (during depression). Is seeking qualified managers of technical services. Will offer the highest earning potential in our industry, plus a stock participation plan and full benefits. (Company soon to go public) Man will have a successful track record in the placement of all D.P. technical positions. Only the best in the business need apply.

Please send resume with complete salary history to:

President  
6519 Hayes Dr.  
L.A., Calif. 90048

## UNIVAC SYSTEMS ENGINEER

Needed . . . sharp, aggressive Univac Systems field engineer. Requires in-depth training on Univac 1100 and 400 with good working knowledge of current software. Will be working with Engineering on development of new products . . . responsible for development of service aids, field engineering documentation, and training of instructors. Will advance into National Tech Support position on completion of the development program. Submit resume to:

STORAGE  
TECHNOLOGY  
CORPORATION

Att: H. Marsden,  
Personnel Office  
2270 So. 88th St.  
Louisville, Colo. 80027  
An Equal Opportunity Employer

## POSITION ANNOUNCEMENTS

## PROGRAMMER ANALYST

## THE JOB

Major Midwest Bank is seeking proven performer experienced in time or demand deposit and MICR entry systems. Must be able to communicate effectively with non technical management.

## REQUIREMENTS

Experience in successfully completing a large project. Ability to work without extensive supervision. A working knowledge of IBM 360-370 OS MVT with emphasis on COBOL. ALC experience helpful. University degree in mathematics, business, or physical science and a minimum of 2 years experience.

This position requires an individual who has the capabilities and willingness to move into Sr. Systems management within 2 years.

## SALARY

Commensurate with ability. Send confidential reply to:

PERSONNEL DEPARTMENT  
THE OMAHA NATIONAL BANK  
17th & FARNAM  
OMAHA, NEBRASKA 68102  
*An Equal Opportunity Employer*

## COMPUTER SYSTEMS

## Sales Support

This new career position requires a thorough, up-to-date knowledge of IBM computers from the performance/cost/value standpoint. Ideally you should have been associated with a major mainframe manufacturer (preferably IBM), dealing and communicating with customer management people about the alternatives available to them in the selection and use of hardware and software.

Your most important responsibility will be to help relate the performance of our computer equipment (from a huge inventory including more than 130 medium and large scale computers — primarily IBM — plus peripherals) to the specific needs of prospective customers. No direct selling is required. However you will be called upon to provide extensive customer assistance and technical sales support, involving travel (but no weekends away).

Computer Leasing Company, established in 1966, has long been a pacesetter in third-party vending of computer equipment. We buy, sell, lease and rent equipment on a worldwide basis through our 11 U.S. offices and foreign subsidiaries. You will find our salary and benefits program consistent with the demands of this position. Please send your resume to Mr. Hayden E. Williams.



2001 Jefferson Davis Highway, Arlington Va. 22202  
*An equal opportunity employer m/f*

## APL

Expansion and diversification have created new positions for individuals with APL experience.

TEKTRONIX, INC., manufacturer of low cost Graphic Computer Terminals, has immediate openings for analyst/programmers in these areas:

## DEVELOPMENT

Analyst/Programmers needed to design and develop new APL software for Graphics Terminals.

Experience with APL and Assembly Language Programming necessary. Systems programming and knowledge of generalized computer concepts and Theory desired and two years experience with Assembler language.

## SUPPORT

Provide marketing support to Tektronix sales staff and, as required, to customers, in use of TEKTRONIX PLOT 10 APLGRAPH and associated software products, including assisting in developing training programs for regional software and sales personnel.

Requiredments include a B.S' in Computer Science or equivalent plus experience using APL.

TEKTRONIX, Inc., located just outside Portland, Oregon, is an internationally recognized leader in electronic display and measurement instrumentation, offers liberal benefit and profit-sharing programs. Starting salaries are open with progression based on demonstrated performance.

For prompt consideration please send your resume to:

Ron Elarth  
Tektronix, Inc.  
P.O. Box 500 ID  
Beaverton, Oregon 97005  
*AN EQUAL OPPORTUNITY EMPLOYER*

## POSITION ANNOUNCEMENTS

## DIRECTOR

## OF COMPUTING CENTER &amp; CHAIRMAN OF COMPUTER SCIENCE DEPT.

Direct staff of 13 in computing center. Administration of & teaching in computer science dept. with faculty of six. Requires doctorate, administrative experience & strong commitment to computer science in liberal arts context. Contact

John H. Short  
State University College  
Potsdam, N.Y. 13676  
*An Equal Opportunity Employer*

## MARKETING REPS

Experienced marketing representatives wanted by established software firm with information system data base package having 125 current users. Solid background needed to provide follow through after initial sales contact. System sold principally to user groups in areas of Personnel, Marketing, Financial Planning, Engineering, etc. Excellent earning potential and association with profitable, versified company offered.

CW Box 3854  
60 Austin Street  
Newton, Mass. 02160

## PROGRAMMER ANALYST

This Medical Research Computer center will soon institute H6060 with OS and telecommunications environment. We require H6000 COBOL experience. Competitive salary to suit your ability. Good advancement and benefits.

Send resume to:

Manager of Employee Relations  
CPHA  
1968 Green Road  
Ann Arbor, Mich. 48105  
*An Equal Opportunity Employer*

## IBM

## FIELD ENGINEER

165/OS Trained  
in Software

Salary Open & Stock Options  
Please reply in confidence to:  
Barry J. King  
HUDSON ASSOCIATES  
44 Montgomery St. #4250  
San Francisco, Ca. 94104  
(415) 391-2770

## SYSTEMS PROGRAMMER

Unusual Opportunity for Mature  
Systems Programmer  
(370-155-OS/MVT-HASP)

A large educational institution needs a mature individual ready to assume project responsibility and technical leadership. Ideally he should have 2 years commercial programming experience, 2 years OS software experience, working knowledge and experience with OS facilities. HASP: proficiency in BAL and 1 high-level language, also he must be capable of independent work, like to write, have strong desire to advance. BS or BA degree desirable. Liberal fringe benefit program. Send resume to:

The University of Akron  
Computer Center  
Robert L. Brieche  
302 East Buchtel Avenue  
Akron, Ohio 44325  
*An Equal Opportunity Employer*

OPERATIONS  
RESEARCH  
ANALYST  
PhD

Requires experience related to development of long range plans for \$25 million computer center. Knowledge of State-of-the-Art computer and telecommunications technology essential. UNIVAC 1108 experience desirable. Send complete resume including salary history to:

CORDURA COMPUTING  
& SOFTWARE GROUP  
1010 Gause Boulevard  
Slidell, La. 70458  
(504) 255-6374  
*An Equal Opportunity Employer*

## POSITION ANNOUNCEMENTS

DIRECTOR, INFORMATION  
and  
INSTRUCTIONAL SYSTEMS

Large educational cooperative seeks a director for all data processing services. Position includes responsibility for planning, design, implementation and operation of a variety of applications. Applicant must have experience in a multiuser environment.

Send Resume To:

Dr. Gloria Kinney, Executive Dir.  
NORTHWEST EDUCATIONAL  
COOPERATIVE  
500 S. Plum Grove Road  
Palatine, Illinois 60067

## PROGRAMMERS

Looking For  
A Change?

THE FEDERAL RESERVE BANK OF PHILADELPHIA has CAREER OPENINGS for results-oriented individuals with the following backgrounds:

SENIOR  
PROGRAMMERS

...with a thorough knowledge of 360/370 equipment, programming in assembly language or COBOL, D.O.S. or O.S., and have Direct Access File Design.

## TELEPROCESSING

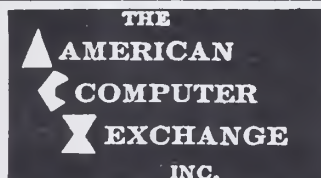
...with 2 years' experience in TELEPROCESSING SYSTEMS, 360/370 exposure, and Direct Access File Design.

These positions offer challenge, growth opportunity, and the chance to utilize your skills, using the latest equipment including IBM 370/145 and 155 with 22 disk drives, 6 tape drives, 2260's, and various other I.O. devices.

Our complete benefits package includes excellent salary, commensurate with abilities, plus a convenient location close to all transportation. Philadelphia is the heart of the Delaware Valley, offering excellent housing facilities, theater, sports attractions, golf clubs, and a superb standard of living.

To discuss your career objectives and goals, and arrange a convenient interview, please call MR. MAZZU, (215) 922-5900, ext. 246, or submit resume with salary requirements, in confidence to:

Mr. L. Mazzu Employment Manager  
FEDERAL RESERVE  
BANK OF PHILADELPHIA  
925 Chestnut Street  
Philadelphia, Pa. 19101  
*Equal Opportunity Employer, M/F*

Buy Sell  
Swap

Offers for Lease  
For \$2300/mo.

IBM 360/30 with 96K Core.  
Features 3237, 4427, 4760, 4456, 5856, 6960, 6961, 7520, 7915, 1051-N1, 1052

Also Available  
for Sale or Lease

2841, 2311's, 1004, 1005's  
Call at: (216) 464-3881  
or write: 24500 Chagrin Blvd.  
Beachwood, Ohio 44122

1401's  
FOR SALE OR LEASE

Low Purchase Prices

(2) 8K Systems  
with 1402, 1403-2, 1406-1  
1100/mo 2 yr. lease  
(1) 12K System with disk  
adapter  
and 1402, 1403-2, 1406-2  
1400/mo 2 yr. lease  
(1) 16K System with (4) 729-2's  
and 1402, 1403-2, 1406-3  
1900/mo 2 yr. lease

729-5's & 6's available  
THOMAS COMPUTER CORP.  
625 N. Michigan Suite 500  
Chicago, Ill. 60611  
(312) 944-1401

## BUY SELL SWAP

UNIVAC  
1005

Maximum Configuration 4K, 2  
Tapes, Communications, 600  
1pm Printer, Card Punch, Paper  
Tape Punch. Availabel May  
15th. \$18,000, or offer  
Call: (213) 638-4409  
Norm Grant

FOR SALE  
G.E. 225 SYSTEM

16,382 Word Core  
8 Tape Drives  
1100 LPM Printer  
Card Reader  
Card Punch  
Available Immediately  
Finserv Computer Corp.  
1462 Erie Boulevard  
Schenectady, New York 12305  
(518) 374-4430

FOR SALE  
IBM  
Magnetic Tape

3200 FCI — 2400 Ft. Reels  
Minimum Order — 48 Reels  
\$6.00/Reel  
Orders of 96 Reels or More  
\$5.00/Reel  
Call John Davis  
(215) 968-5900

## FOR SALE BY OWNER

## 360/30F 65K

with 1051/1052  
Decimal Arithmetic. Interval Timer.  
Storage Protect. Two Selector Channels. 1401 Basic Compatibility. Available August 1.

Principals Only  
Reply To:  
CW Box 3893  
60 Austin Street  
Newton, Mass. 02160

SIGMA 2  
SYSTEMS

One of the industries most popular  
process control machines

Refurbished Systems

Peripherals

Parts

Support

H. Mundee

(213) 889-6031

VALLEY COMPUTER  
A Division of Tymshare Inc.

## MAGNETIC TAPE

1600 BPI

800 BPI

|       | recerti-<br>fied | uncerti-<br>fied |
|-------|------------------|------------------|
| 2400  | \$6.00           | \$3.50           |
| 1200  | 5.00             | 3.00             |
| seals | thinline         | thickline        |
| IBM   | Memorex          | Scotch           |

released from  
GEOPHYSICAL Archives  
not work tapes  
(713) 772-5557  
C.A.R.D.  
7575 Bellaire Blvd.  
Houston, Texas 77036

360/20, C1, 8K  
2203  
2560(1575)

Available Immediately  
CMI Corporation  
16225 East Warren Avenue  
Detroit, Michigan 48224  
(313) 889-0440

## BUY SELL SWAP

**FOR SALE**

Two 128K Units Of  
**IBM CORE**  
for 360 model 40  
Call or Write  
Programming Manager  
P.O. Box 44  
Wall Street Station  
New York, N.Y. 10005  
(212) 944-4900 Ext. 644

**THE  
AMERICAN  
COMPUTER  
EXCHANGE  
INC.**

ANNOUNCES A NEW  
CONCEPT IN  
COMPUTER MARKETING  
An EDP EQUIPMENT EXCHANGE

on which your company lists  
its equipment. Buy-Sell-Lease  
Sub-Lease or Finance

Benefits? One outlet for:

- National and International Mailings
- Broker/Dealer Mailings
- National Advertising
- Assistance in Sale/Purchase
- Transportation and Installation Arranged
- Assistance in Lease/Finance Packages

Payment for equipment goes  
directly from Buyer to Seller!!!!

Cost? No charge for subscrip-  
tion or "Buy" listings.  
\$25 for "Sell" listings

5% service charge paid by Seller

Information?  
Call ACX at (216) 464-3881  
or write to: ACX  
24500 Chagrin Blvd.  
Beachwood, Ohio 44122

**FORSYTH  
McARTHUR ASSOCIATES, INC.**  
**PROFESSIONAL IBM  
COMPUTER DEALERS**

**360/370**

**BUY-SELL-LEASE**  
\*Call or Write\*

919 North Michigan Avenue  
Chicago, Ill. 60611  
(312) 943-3770

**UNIVAC  
9300**

16K, 4 Tapes, Punch,  
Reader Printer.

For Immediate Lease  
24- to 48 Months

Under Univac Maintenance  
From \$2,085 to \$1,885

Maintenance approx. \$850  
Call: (214) 350-9921

Bill Shaw

**2030 SYSTEM FOR LEASE**

TYPE MODEL SERIAL NO.

|      |    |       |
|------|----|-------|
| 2030 | F  | 15405 |
| 1051 | N1 | 51582 |
| 1052 | 6  | 61620 |
| 1403 | N1 | 31988 |
| 2501 | B2 | 20192 |
| 2520 | B3 | 20115 |
| 2821 | 02 | 20347 |

Data Automation Company  
4858 Cash Road  
Dallas, Texas 75247  
Ron Johnson (214) 637-6570

**FOR SALE  
OR LEASE**

IBM 1401  
4K to 16K Systems  
with or without  
Tape Drives & Disks  
Savings in thousands.

**D.P. Equipment  
Marketing Corp.**  
260 W. Broadway, N.Y. N.Y.  
CALL (212) 925-7737 Ext. 1

## BUY SELL SWAP

**Computer Owners Only  
RECEIVE FULL PAYMENT  
NOW!**

Commerce Group Corp. will buy  
your installed IBM System and  
lease it back to you on a  
monthly term basis.  
You will benefit by one of the  
following:

1. Trade in 360 equipment and get full benefit on 360 or 370 lease if desired;
2. Restoring flexibility to establish competitive environment;
3. Deal in used market with cash;
4. Take advantage of Commerce Group's financial strength and field engineering expertise to profit on next move.

Contact: T.E. Tilden  
Senior Vice President  
COMMERCE GROUP CORP.  
6001 North 91st Street  
Milwaukee, Wis. 53225  
(414) 462-5310

**1400-360**

**Specialists**

in  
1401, 1440

360/20, 360/30

**Hundreds  
of Satisfied  
Users**

**Free  
Appraisal  
Service  
BUY-TRADE  
SELL-LEASE**

**Call us last-  
but  
Call Us!**

**CM**

Area Code 313-  
889-0440  
16225 E. Warren  
Avenue  
Detroit, Mich.  
48224

**AVAILABLE  
FOR SALE  
OR LEASE**

IBM 1401 16K Tape and Disk System;  
IBM 1401 12K Tape System;  
IBM 1401 8K System. If you need  
1401 equipment, we can supply your  
requirements.

THE HALSEY CORPORATION  
1367 Central Avenue  
Middletown, Ohio 45042  
(513) 424-1697

**FOR SALE**

(2) 2030-F - FEB.

1 & 2 Channel, With  
Compatibility

1403-3 - Now  
1403-2 - Now  
2415-II - March

**SALE/LEASE/  
LEASE-PURCH.**

**HONEYWELL**

**1200 - 32K  
TAPE-DISK SYSTEM**

AVIAL - MAY 1973

ACS Equipment Corporation  
8928 Spring Branch Drive  
Houston, Tx 77055  
(713) 461-1333

## BUY SELL SWAP

**we buy  
and sell**

IBM Computer Systems  
& Unit Record Machines  
NCR 31-32-33-395-400  
Burroughs - L Series

**marion**

84 Kennedy St.  
Hackensack, N.J.  
07601  
(201) 343-4554

**TAPE SALE  
OVER 75% OFF**

- (1) IBM 2404-2
- (2) IBM 2402-2 two drive units with simultaneous read write

729-2's

729-5's

729-6's

THOMAS COMPUTER CORP.  
625 N. Michigan Ave. Suite 500  
Chicago, Ill. 60611  
(312) 944-1401

**FOR SALE OR LEASE**

**BY OWNER**

**360/40**

**Model G or H**

Call or Write  
Mr. D.R. Tebo

C.I.S. Corp.  
Midtown Plaza  
Syracuse, N.Y.  
(315) 474-5776

**AVAILABLE  
FOR SALE OR  
LEASE**

IBM 729 Magnetic Tape Units,  
Models II, IV, V and VI

THE HALSEY CORPORATION  
1367 Central Avenue  
Middletown, Ohio 45042  
(513) 424-1697

**CDI**

a fast growing marketing- and develop-  
ment-oriented data processing  
enterprise at Konstanz/W. Germany,  
is looking for the representation of  
American peripherals in Europe, for  
rotating memory devices, especially  
floppy disc and slow tape units.

Please write to:

COMPUTER DESIGN  
INTERFACE GMBH  
81 a, Reichenaustrabe  
775 Konstanz/W. Germany

**WANTED  
TO BUY**

Accounting Machines  
NCR, Burroughs, Friden, Mo-  
hawk

Most All Terminals  
Call Jack Faubion  
(404) 934-5650

WHOLESALE DATA  
CONTROLS, INC.  
4609 Lewis Road  
Stone Mountain Ga. 30083

**Buy  
Sell  
Lease**

1401 1410 7074 360  
729's also Systems  
& Components  
Terminals & Plotters

EBM 625 Bard Ave.  
Staten Island, N.Y. 10310  
Phone: (212) 273-3636

## BUY SELL SWAP

**For lease  
by owner**

**360/40 G or GF**

Floating point. Direct Control.  
Decimal Arithmetic. Two Selec-  
tor channels. Storage protect.  
With or without I/O set and  
peripherals.

Available July 1973  
EDP RESOURCES INC.  
One North Broadway  
White Plains, N.Y. 10601  
(914) 428-3804

**FOR SALE  
IBM UNITS**

1401 Tape Systems

C6-16K-M/D, PS, Disk, 800  
BPI, Serial I/O. C5-12K-M/D,  
PS, PFR, COL. Binary, Serial  
I/O IBM 729-V, IBM 729-VI,  
MAI 7295 Tape Drives.

1403-2 Printers

System 3 Units

Bi-Sync Communications  
Dual Feed Carriage Sorter

7094 System with (6)

2702 Transmission Control

2311 Disk Drives

2420-7 Magnetic  
Tape Drive

2401-5 Magnetic  
Tape Drives

Plug Compatible-MAI 2405  
2848/2260 DISPLAYS  
& CONTROL

SR 1500 Data Products  
Card Readers (For

360/370) 1500/200 CPM

Call: (617) 227-8634

We BUY Any Computer

Peripheral or Teletype

Send for FREE Price List

AMERICAN USED

COMPUTER CORP.

15 School Street

Boston, Mass. 02108

**For Sale**

**WANG 3300**

MINICOMPUTER

with 32K (bytes), dual cassette  
drive, BASIC, FORTRAN, AS-  
SEMBLER, EDITOR. Supply of  
programs available. Ideal for  
small business or accounting  
firm.

Contact M. Sisois  
(408) 984-4587

**FOR SALE OR LEASE**

IBM 1401 Systems 12K & 4K  
7330 Tape Drives All Under  
Maintenance



BROOKS INTERNATIONAL  
A.C. (817) 531-2761  
2731 Ludelle St.  
Fort Worth, Tex. 76105

**For lease by  
owner  
360/30  
E or F**

Available immediately with any  
features. I/O set and peripherals  
also available.

EDP RESOURCES INC.  
One North Broadway  
White Plains, N.Y. 10601  
(914) 428-3804

**TELETYPES**

**BUY - SELL - REFURBISH**

- All Models - 28 thru 37
  - Couplers, Modems, CRTs
  - All equipment warranted as new
- DCEB has a complete facility for  
reconditioning all models of tele-  
types. We also broker other types of  
communication equipment.  
If you have any of the above for sale,  
please contact us.

**DATA COMMUNICATION  
EQUIPMENT BROKERS INC.**  
1900 Thunderbird Street  
Troy, Michigan 48084  
(313) 689-2640

**ELECTRONIC DATA EQUIPMENT  
FOR SALE**

- 1 Central Processor: B300 Model "O"  
with improved 9.6K memory  
1 Card Reader: B124 800 C.P.M.  
1 Card Punch: B303  
1 Sorter Reader: B102  
1 Line Printer: B321 Printer Positions,  
600 C.P.M. 132 Printer Position

4 Magnetic Tape Units: B421 556 B.P.I.  
Please contact  
Miss Elizabeth Belanger  
First Bank of Oak Park  
11 Madison Street  
Oak Park, Illinois 60302  
(312) 386-5000

**For Sale by Owner  
NCR Century 100  
32K System**

Low usage - new in Feb.

1970  
Includes all disks, tape & man-  
uals

Continuous NCR maintenance

Call or Write:

Mr. D.F. Benn  
St. Louis Board  
Of Education  
911 Locust St.  
St. Louis, Mo. 63101  
314/231-3720

**360/30, 65K  
(LOADED)**

IMMEDIATE DELIVERY  
LOW PRICE  
Call Collect  
CMI Corporation  
16225 East Warren Avenue  
Detroit, Michigan 48224  
(313) 889-0440

**SALE  
OR LEASE**

RECONDITIONED MACHINES

029-\$1950; 026-\$1500; 077-\$1000;  
082-\$1200; 083-\$2900; 085-\$2000;  
552-\$1600; 514-\$1600; 519-\$1600;  
548-\$2300; 402-\$1500; 407-\$2500.

**DATA RENTALS INC.**

2919 S. La Cienega Blvd.  
Culver City, Calif. 90230  
(213) 559-3822

**Univac 1004-II**

Card processor..... \$12,000  
Reader, 600 cpm  
Printer, 600 lpm  
Card punch..... \$3,000

CLAPPER PUBLISHING CO., INC.  
14 Main St.  
Park Ridge, Ill. 60068  
312-825-2161

**WANTED**

**PDP 8L or M  
TRI-DATA 4196**

We need several of each  
We are not brokers  
Donald E. Grempler  
Realty, Inc.  
400 E. Joppa Rd.  
Towson, Md. 21204  
(301) 825-6400 Ext 333

| BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                          | BUY SELL SWAP                                                                                                                                                                                                                                                                       | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                 | BUY SELL SWAP                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FOR SALE OR LEASE</b><br>024-\$350; 026-\$1300; 056-\$250;<br>077-\$550; 082-\$1,000; 083-\$2900;<br>085-\$1800; 088-\$5200; 402-\$1300;<br>403-\$1500; 407-\$3500; 514-\$1300;<br>519-\$1600; 548-\$2300; 552-\$1500;<br>557-\$3700; 602-\$400; 2311 (1)<br>\$5000; 729 (5) \$2500; 729 (6)<br>\$3000; 1448 (1) \$1000; 1401<br>systems \$17,500 & \$35,000.<br><b>THOMAS COMPUTER CORP.</b><br>625 N. Michigan-Suite 500<br>Chicago, Ill. 60611<br>(312) 944-1401 | <b>IPS has a 360/40G</b><br>with (2) channels available on a<br>month-to-month lease. Need addi-<br>tional capacity now? Call us for im-<br>mediate shipment.<br><b>IPS</b><br><b>Computer Marketing Corp.</b><br>467 Sylvan Ave.<br>Englewood Cliffs, N.J. 07632<br>(201) 871-4200 | <b>IBM 360/370</b><br><b>BUY...SELL...LEASE</b><br>CALL <b>CEI</b><br><b>AVAILABLE:</b><br>360/30 E, F & FE (96K)<br>CPU's (Serial Nos. 15394,<br>19832)<br>360/65 H or I Systems<br>2312 AI Disc, 2311's<br>2401 Tapes 1, 2, 3 & 5<br>2804-2 Controller (7 & 9<br>track)<br>360/30 IBM 32K Core E2F &<br>F2FE (96K)<br>370/145, 155, 165 CPU's<br><b>CEI - THE ORIGINAL</b><br><b>COMPUTER EXCHANGE</b><br><b>INC.</b><br>11 GRACE AVENUE<br>GREAT NECK, N.Y. 11021<br>(516) 466-6500<br>8105 EDGEWATER DRIVE<br>OAKLAND, CAL. 94621<br>(415) 638-9005                                                                                                                                                                                                                                                | <b>Current Inventory</b><br><b>SALE</b><br>All this Unit Record<br>Equipment in stock and<br>ready to ship at money sav-<br>ing sale or lease prices.<br><b>RARELY OFFERED 046,</b><br>029, 059, 407, A3,<br>548, 557, 087, 088<br><b>OTHER FINE MODELS</b><br>024, 026, 056, 077, 085,<br>402, 403, 407, 514, 519,<br>523, 552, 602, 604, 521, 826<br><b>D.P. Equipment</b><br><b>Marketing Corp.</b><br>260 W. Broadway, N.Y. N.Y.<br>(212) 925-7737 Ext. 1 | <b>WANTED</b><br><b>NCR 395, 400</b><br><b>BURROUGHS</b><br><b>L2000 to L5000</b><br><b>Burroughs Card Punch</b><br>Model A 149<br>Call Stuart Rubenstein<br><b>I.O.A. Data Corp.</b><br>383 Lafayette St., N.Y. 10003<br>(212) 673-9300 |
| <b>CDC 3300 81K Master System</b><br><b>For sale or lease</b><br>Wanted: IBM 370's.<br>Will purchase 370 systems<br>for resale or lease-back.<br><b>Computer Systems</b><br><b>of America, Inc.</b><br>79 Milk Street, Boston, MA 02109 (617) 482-4671                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                     | <b>WANTED</b><br><b>ALL 360 SYSTEMS</b><br>360/30 1401 1440 2311 360/20 360/40 360/25<br><b>CORPORATE</b><br><b>COMPUTERS, INC.</b><br>420 Lexington Avenue, New York, N.Y. 10017 (212) 532-1200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |
| <b>Before you Buy—Lease—Sell</b><br><b>360-370</b><br><b>CPU—TAPE DRIVES—DISK DRIVES—CORE—I/O</b><br>call collect or write:<br><b>COMDISCO, INC.</b><br>2200 E. DEVON AVENUE<br>DES PLAINES, ILLINOIS 60018<br>TELEPHONE 312-297-3640<br><b>THE LARGEST DEALER IN THE WORLD SPECIALIZING</b><br><b>IN MARKETING PRE-OWNED IBM EQUIPMENT</b>                                                                                                                            |                                                                                                                                                                                                                                                                                     | <b>SACRIFICE</b><br><b>NO REASONABLE OFFER</b><br><b>REJECTED:</b><br>2 IBM Type 082 Card Sorters, also<br>083 and 084<br>IBM Type 548 and 552 Interpreters<br>IBM Type 085, 087 and 088 Colla-<br>tors, also 077 Alpha.<br>5 IBM Type 026 Key Punches<br>2 IBM Type 046 Tape to Card Ma-<br>chines<br>IBM Type 059 Verifiers, Model 2,<br>also 056<br>IBM Tab Accounting Machine Type<br>407, 403 and 402<br>IBM Type 519 Document Originating<br>Machine with 27 position Mark<br>Sense, as well as IBM Type 514 Re-<br>producing Punch.<br>NCR Computer Type 395 with 120<br>Totals, NCR Sorter and Key Punch<br>with 2 Model 395, Complete System<br>Phone Collect: Area Code<br>(313) 584-9797<br><b>MICHIGAN SYSTEMS</b><br><b>RESEARCH COMPANY</b><br>6661 Schaefer<br>Dearborn, Michigan 48126 |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |
| <b>360/25 1130</b><br>360/25 (16K) with 1401 Com-<br>patibility, 2540, 1403-N1, 2415<br>available immediately for sale or<br>lease. Excellent replacement for<br>1401 or 360/25 on rental.<br><b>IPS</b> <b>IPS COMPUTER MARKETING CORP.</b><br>467 Sylvan Ave., Englewood Cliffs, N.J. 07632 (201) 871-4200                                                                                                                                                           |                                                                                                                                                                                                                                                                                     | <b>WANTED</b><br>to purchase<br><b>Honeywell</b><br><b>Series 200</b><br>H-115, -120, -200, etc. 24-32K 2<br>disk, 3 tape, printer, card<br>ALSO<br>2314 or equiv. indep. disk drives.<br>Reply stating prices & specs.<br>P.O. Box 4048<br>Portland, Oregon 97208                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |
| <b>BUY SELL LEASE TRADE</b><br><b>360 ... 370</b><br><b>CPU ... CORE ... I/O</b><br><b>TAPE/DISC DRIVES</b><br><b>CALL (612) 546-4422</b><br><b>DATASERV</b><br><b>EQUIPMENT</b><br><b>INC.</b><br>400 Shelard Plaza, MPLS. MN. 55426                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                     | <b>FOR SALE</b><br><b>IMMEDIATELY AVAILABLE</b><br><b>360/40</b><br>G, GF, or H<br><b>CALL COLLECT OR WRITE—T. H. MADDOX</b><br><b>Comdisco Inc.</b><br>2200 DEVON • DES PLAINES<br>ILLINOIS 60018<br>312-297-3640                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |
| <b>We Need:</b><br>1419 MOD 1<br>2311 MOD 1<br>2415 MOD IV<br>360/65<br><b>BUY</b><br><b>SELL</b><br><b>LEASE</b><br><b>FOR</b><br><b>BETTER</b><br><b>VALUE</b><br><b>LOOK TO:</b><br><b>cac</b> <b>COMPUTER ACQUISITIONS COMPANY</b><br>P O BOX 80572, ATLANTA GA 30341 • (404) 458-4425                                                                                                                                                                             |                                                                                                                                                                                                                                                                                     | <b>Available:</b><br>360/40-128K<br>360/40-196K<br>1403 MOD 111<br>2821 MOD V<br><b>OAS</b><br><b>FOR SALE OR LEASE</b><br>360/20/30/40 CPU's<br>& Systems 1401, 1440,<br>1620, 2311, 2841,<br>Univac 9200 System<br>All Types Unit Record<br><b>LEASE OR LEASE PURCHASE</b><br>Two 1401-16K with 729's<br>One 1401-12K with 729's<br><b>CALL or WRITE</b><br><b>Data Automation</b><br><b>Services, Inc.</b><br>4858 Cash Road<br>Dallas, Texas 75247<br>(800) 527-6148<br>318 W. 28th Street<br>Los Angeles, Calif. 90007<br>(213) 747-0587<br>7750 N.W. 7th Avenue<br>Miami, Fla. 33150<br>(305) 693-3911                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |
| <b>BEFORE</b><br><b>YOU BUY</b><br><b>GO GREYHOUND</b><br><b>BEFORE</b><br><b>YOU SELL</b><br><b>PHONE:</b> (602) 248-5972<br><b>WRITE:</b> Manager of Resale Equipment<br>Greyhound Computer Corporation<br>Greyhound Tower<br>Phoenix, Arizona 85077                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                     | <b>WANTED</b><br>360/65's 360/50's<br>360/30's 2314<br><b>FOR SALE</b><br>2040-g<br>feat: 3237, 4427,<br>6980, 6981, 7520,<br>7920, 1052-7<br>2314's<br><b>Fairfield Memory</b><br>will buy 135, 145, 155, 165.<br>Mod. 30, 40, 50, 65 CPU's.<br><b>Fairfield Memory</b><br>will lease long-term 145.<br><b>Fairfield Memory</b><br>will sell its own core<br>for 30, 40, 44, 50.<br>65, 67, 75.<br>(714) 557-9873<br><b>Fairfield Memory</b><br>1792 Kaiser Drive,<br>Irvine, Calif. 92664                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                          |

| BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  | BUY SELL SWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--|------|---|----------|--|--|------|--------------------|--|--|------|---------------------------|--|--|------|--------------------|--|--|------|-------------------|--|--|------|-------------------------|--|--|------|----------------------|--|--|------|----------------------|--|--|------|--------------------|--|--|------|--------------|--|------|---|------------------|--|------|---|--------------|--|--|------|-----------------|--|------|----|------------------|--|------|---|-----------------|--|------|---|--------------|--|--|------|-----------------------|-----|------|---|------------|--|--|------|--------------|--|------|---|--------------------------------|
| <p><b>FOR SALE</b></p> <p><b>BURROUGHS L 2000</b><br/>with attachments<br/>Available Immediately<br/>Contact<br/><b>FRANK PELLKOFR</b><br/>ICN<br/>2727 Campus Drive<br/>Irvine, Ca. 92664<br/>or Call: (714) 833-2500</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      | <p><b>FOR SALE</b></p> <p>Approximately 450 sq. ft. of slightly used computer flooring. General Electric perma-kleen tiles, complete with floor jacks. Make an offer. Any questions can be directed to:</p> <p><b>G.K. PEDERSON</b><br/>(414) 964-5800<br/>x428</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                | <p><b>64K 360/30 CPU's</b><br/><b>FOR IMMEDIATE SALE OR LEASE</b></p> <ul style="list-style-type: none"> <li>• 1 Selector Channel</li> <li>• Storage Protection</li> <li>• With or Without 1401</li> </ul> <p>The Computer Exchange, Inc.<br/>Call Dave Siegel<br/>(415) 638-9005</p>                                                                                                                                                                                                                                                                                                                                               |  | <p><b>THE CLC CORNER</b></p> <p><b>COMPUTER LEASING COMPANY</b><br/><b>OFFERS FOR SALE, RENTAL OR LEASE</b><br/><b>UNIVAC 418</b></p> <p><b>COMPLETE WITH DESIRED PERIPHERALS</b></p> <p>Low purchase prices—Buy now, or apply generous rental-credits toward purchase.<br/>Economical rental/lease plans—Terms to fit your needs, from month-to-month to five years; unlimited usage.<br/>Superior quality—Like-new condition; continued maintenance guaranteed.</p> <p><b>CALL (703) 521-2900</b></p> <p>Ask Lee Meadows for name of sales representative nearest you.<br/>The men who know their business get their computing equipment from . . .</p> <p><b>Computer Leasing COMPANY</b></p> <p>2001 Jefferson Davis Highway, Arlington, Va. 22202 • Offices Nationwide<br/>BROKERS cooperation invited. Call Hayden Williams.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  | <p><b>SALE/LEASE</b></p> <p>360/20's</p> <p>C1-8K, 2203 A1, 2560 A1,<br/>C1-8K, 1403-7, 2560 A1,<br/>BC2-12K, 1403-2, 2520 A1,<br/>2501 A2<br/>D2-16K, 2203 A1, 2560 A1, (2)<br/>2311 — 2415-1</p> <p><b>LEASE</b></p> <p>2050 H, HG, I-CPU's</p> <p><b>WANTED NOW</b></p> <p>360/30 E Full System<br/>360/30F CPU, 1051, 1052<br/>All I/O Units<br/>ALL MODEL 360/20's</p> <p><b>CROSS</b><br/>Specialists in placement of pre-owned computer systems. 360/370 &amp; SYSTEM 3 lease financing available.<br/><b>NEW YORK (516) 487-9812</b><br/><b>PHILADELPHIA (215) 568-6621</b><br/>505 Northern Blvd.<br/>Great Neck, N. Y. 11021</p> |      | <p><b>360/370 MARKETPLACE</b><br/><b>BUY·SELL·LEASE</b></p> <p><b>TLW</b><br/><b>COMPUTER INDUSTRIES</b></p> <p><b>WE ALSO HAVE TAPE DRIVES, DISK DRIVES &amp; OTHER PERIPHERAL EQUIPMENT.</b></p> <p>Offices In Chicago<br/>222 E. Wisconsin Avenue<br/>Lake Forest, Illinois 60045<br/>(312) 295-2030</p> |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
| <p><b>Evergreen Computer and Financial, Inc.</b></p> <p><b>HOME OFFICE:</b><br/>Suite 120<br/>9100 Bloomington Freeway West<br/>Bloomington, Minnesota 55431<br/>612/884-9751</p> <p><b>FOR SALE</b></p> <p>2030 F 1.5 (SN 16191)<br/>1990, 3237, 4456, 4465,<br/>4468, 5856, 4760, 6960,<br/>7520<br/>1051-N1<br/>1052-8<br/>2065 J (1 meg. byte 756K)<br/>Fabri-tek add on (SN 60075)<br/>7117<br/>1052-7<br/>2860-2<br/>2870-1<br/>2365-2<br/>(2) 2365 — 2 (SN 30289, SN 30314)</p> <p><b>TO BUY</b></p> <p>2520 — B1<br/>(2) 1442 — N1</p> <p><b>BRANCH OFFICES:</b><br/>2720 Des Plaines Avenue<br/>Des Plaines, Illinois 60018<br/>312/298-7890<br/>312 East Wisconsin Ave.<br/>Milwaukee, Wisconsin 53202<br/>414/276-0909</p> <p>2030 D 1.5 (SN 18948)<br/>3237, 4427, 6960, 7520,<br/>7915<br/>1051-N1<br/>2030 32K (SN 17426)<br/>3237, 6960, 7915,<br/>1051-N1<br/>1052-8<br/>2365 — 13 (SN 30064)<br/>2030 16K (SN 11445)<br/>3237, 4467, 5250, 4463, 5856<br/>CDC 3300 System<br/>3304-3, 3311, 3310, (8) 3302,<br/>(8) 3306, 3423, (8) 604, (1)<br/>3234, (4) 854, 415, 3446,<br/>405, 3447, 512-1, 595-1,<br/>3555-1</p> <p>1401 Tape and Disk System<br/>2821-2</p> <p>1311-2</p> |      | <p><b>PERSONAL:</b><br/><b>TO ALL EDP MANAGERS</b></p> <p>First National Boston (FNB) a top-ranking international financial institution with assets of over \$6.3 billion, is now leasing IBM S/360 and S/370 computers and peripherals through an FNB affiliate, Randolph Computer Company. FNB's entry into computer leasing now provides the solid financial base required for highly flexible short and long-term computer leasing of IBM computers and peripherals by IBM users.</p> <p>During 1972, leasing of S/360 and S/370 CPUs and peripherals saved Randolph's computer-leasing customers over \$22 million in rentals . . . in just one year. These users of Randolph's computers, who number over 200, are distributed across all of the 12 major U.S. industry sectors, with small firms as well as large corporations sharing in cost-saving leases from Randolph. Financial institutions, too—the professional money managers—are well represented among the EDP users who analyzed financial alternatives, then selected the most flexible lease plan for them: a plan designed by RCC for their changing needs.</p> <p>For your up-to-date lease plan, contact RANDOLPH, THE COMPUTER LEASING COMPANY, now:</p> <ul style="list-style-type: none"> <li>• 537 Steamboat Rd., Greenwich, CT, 06830 (203) 661-4200</li> <li>• 8060 Montgomery Rd., Cincinnati, OH, 45236 (513) 793-6060</li> <li>• 530 "B" St., San Diego, CA, 92101 (714) 131-6401.</li> </ul> |                                | <p><b>SALE or LEASE</b></p> <p>Immediate Availability<br/>on IBM M/A</p> <p>1401 C5-12K<br/>• 1402 • 1403 • 1406-2</p> <p>360 D2<br/>• 2020-D2 • 1442-5 • 2501-A2<br/>• 1403-2 • (2) 2311-11</p> <p>360 D2<br/>• 2020 D2 • 1442-5<br/>• 2501-A2 • 2203A-1</p> <p><b>I.O.A. DATA CORP.</b><br/>383 Lafayette St., New York<br/>(212) 673-9300</p>                                                                                                                                                                                                                                                                                    |  | <p><b>WANTED 360-40</b></p> <p>We are a user seeking a user who has available for a four (4) or five (5) year term, the following configuration:</p> <table border="1"> <thead> <tr> <th>Quantity</th> <th>Type</th> <th>Feature or Model</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td></td> <td>2040</td> <td>H</td> <td>256K CPU</td> </tr> <tr> <td></td> <td></td> <td>3237</td> <td>Decimal Arithmetic</td> </tr> <tr> <td></td> <td></td> <td>4427</td> <td>Floating Point Arithmetic</td> </tr> <tr> <td></td> <td></td> <td>4457</td> <td>1401 Compatibility</td> </tr> <tr> <td></td> <td></td> <td>4460</td> <td>DOS Compatibility</td> </tr> <tr> <td></td> <td></td> <td>4462</td> <td>Reloc DOS Compatibility</td> </tr> <tr> <td></td> <td></td> <td>6980</td> <td>1st Selector Channel</td> </tr> <tr> <td></td> <td></td> <td>6981</td> <td>2nd Selector Channel</td> </tr> <tr> <td></td> <td></td> <td>7520</td> <td>Storage Protection</td> </tr> <tr> <td></td> <td></td> <td>7920</td> <td>1052 Adapter</td> </tr> <tr> <td></td> <td>1052</td> <td>7</td> <td>Printer-KeyBoard</td> </tr> <tr> <td></td> <td>2821</td> <td>1</td> <td>Control Unit</td> </tr> <tr> <td></td> <td></td> <td>3615</td> <td>Printer Adapter</td> </tr> <tr> <td></td> <td>1403</td> <td>N1</td> <td>1100 LPM Printer</td> </tr> <tr> <td></td> <td>2540</td> <td>1</td> <td>Card Read Punch</td> </tr> <tr> <td></td> <td>2803</td> <td>2</td> <td>Tape Control</td> </tr> <tr> <td></td> <td></td> <td>5320</td> <td>9 Track Compatibility</td> </tr> <tr> <td>(4)</td> <td>2401</td> <td>6</td> <td>Tape Drive</td> </tr> <tr> <td></td> <td></td> <td>3471</td> <td>Dual Density</td> </tr> <tr> <td></td> <td>2314</td> <td>1</td> <td>Direct Access Storage Facility</td> </tr> </tbody> </table> <p>Please reply at your earliest convenience:<br/>Post Office Box 91446 Chicago, Illinois 60693</p> |  | Quantity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Type | Feature or Model                                                                                                                                                                                                                                                                                            | Description |  | 2040 | H | 256K CPU |  |  | 3237 | Decimal Arithmetic |  |  | 4427 | Floating Point Arithmetic |  |  | 4457 | 1401 Compatibility |  |  | 4460 | DOS Compatibility |  |  | 4462 | Reloc DOS Compatibility |  |  | 6980 | 1st Selector Channel |  |  | 6981 | 2nd Selector Channel |  |  | 7520 | Storage Protection |  |  | 7920 | 1052 Adapter |  | 1052 | 7 | Printer-KeyBoard |  | 2821 | 1 | Control Unit |  |  | 3615 | Printer Adapter |  | 1403 | N1 | 1100 LPM Printer |  | 2540 | 1 | Card Read Punch |  | 2803 | 2 | Tape Control |  |  | 5320 | 9 Track Compatibility | (4) | 2401 | 6 | Tape Drive |  |  | 3471 | Dual Density |  | 2314 | 1 | Direct Access Storage Facility |
| Quantity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Type | Feature or Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Description                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2040 | H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 256K CPU                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 3237                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Decimal Arithmetic             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 4427                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Floating Point Arithmetic      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 4457                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1401 Compatibility             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 4460                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | DOS Compatibility              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 4462                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Reloc DOS Compatibility        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 6980                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1st Selector Channel           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 6981                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2nd Selector Channel           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 7520                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Storage Protection             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 7920                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1052 Adapter                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1052 | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Printer-KeyBoard               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2821 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Control Unit                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 3615                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Printer Adapter                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1403 | N1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1100 LPM Printer               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2540 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Card Read Punch                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2803 | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Tape Control                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 5320                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 9 Track Compatibility          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
| (4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2401 | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Tape Drive                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      | 3471                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Dual Density                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2314 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Direct Access Storage Facility |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |
| <p><b>BUY·SELL·LEASE</b><br/><b>360/20</b></p> <p>360 30/40/50 1130 370 145/155</p> <p><b>ECONOCOM</b></p> <p>Division of Cook Industries, Inc.<br/>2185 Democrat Road — P.O. Box 16902<br/>Memphis, Tennessee 38116<br/>901-396-8890 or 901-396-8600</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      | <p><b>IPS</b><br/>Computer Marketing Corp.<br/>467 Sylvan Ave.<br/>Englewood Cliffs, N.J. 07632<br/>(201) 871-4200</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                | <p><b>buy·lease·sell</b><br/><b>370 &amp; 360 EQUIPMENT</b></p> <p><b>CIS PRESENTS ECONOMY IN IBM HARDWARE, and backs it up with an established reputation for service, dependability and a penchant for detail. No loose ends. Personal contact with experience gathered in the field combine to bring you maximum economy and razor sharp performance. Talk to a CIS man now. You know he'll deliver!</b></p> <p>Branch Offices:<br/>HARTFORD, CONN.<br/>PITTSBURGH, PA.<br/>WASHINGTON, D.C.</p> <p><b>CIS</b><br/>CONTINENTAL INFORMATION SYSTEMS CORPORATION</p> <p>MIDTOWN PLAZA, SYRACUSE, NEW YORK 13210 (315) 474-5776</p> |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                                                                                                                                                                                                                                                                                             |             |  |      |   |          |  |  |      |                    |  |  |      |                           |  |  |      |                    |  |  |      |                   |  |  |      |                         |  |  |      |                      |  |  |      |                      |  |  |      |                    |  |  |      |              |  |      |   |                  |  |      |   |              |  |  |      |                 |  |      |    |                  |  |      |   |                 |  |      |   |              |  |  |      |                       |     |      |   |            |  |  |      |              |  |      |   |                                |

## Time for Sale

### CALIFORNIA

**COMPUTERISTIC S**

SUBSIDIARY OF

**UNIROYAL**

Computer Time

IBM 360/40-128K  
4-Dual Density Tape Drives  
2314 2-1403-N1 2540  
Prime Time or Weekends  
Stand-alone or Partition Time  
Call Bob Kay  
(714) 557-5612 or 557-5613  
Santa Ana, California

### NEW JERSEY

**S/360/50/40/30**

1287

2671 Paper Tape Reader  
ALL SHIFTS  
Call: Roy Einreinhofer  
Popular Services, Inc.  
(201) 471-2577

### MICHIGAN

**COMPUTERISTIC S**

SUBSIDIARY OF

**UNIROYAL**

Computer Time

IBM 360/50 - 256K  
IBM 360/65 - 2512K  
IBM 370/155 - 1,572K  
\*OS - MVT - HASP III  
\*3330 DASD  
\*3420 Tape Drives  
\*Professional Staff  
\*Remote Network Serving all terminal types.  
Call Ed Case  
Allen Park, Michigan  
(313) 274-3700

### ARIZONA

## 360/65 COMPUTER TIME

Time is presently available for sale on large-scale OS/MVT machine complex (all shifts). Clients will be provided with highly qualified software technical support, guaranteed data and program protection, and excellent turnaround. Complex: Six 9-track dual density tape drives, eight 2314 equivalent disk drives, 512k memory and two 1403N1 printers.

## HUGHES AIRWEST

MANAGEMENT INFORMATION SERVICES

P.O. Box 20745  
Phoenix, Arizona 85036  
Phone: (602) 273-9488

### TIME FOR SALE

### NEW YORK

**I.B.M. - 360-30**

All Shifts 65K, 4-2401 MOD-2, 3-2311, 1403-N1, 2540, 1403 Compatibility  
From \$35.00/Hour

Restaurant Associates Ind.  
1540 Broadway bet. 45 & 46th St.  
New York, New York 10036  
Contact:  
Art Strasser at (212) 974-6857  
Al Palmo at (212) 974-4966

### NEED A SHIFT ? OR SOME SMALL SHOTS

MIDTOWN LOCATION  
360/20/40/50  
PARTITION OR DEDICATED  
DOS; OS/MFT, HASP  
COMPETITIVE RATES  
EXCELLENT ENVIRONMENT  
CONTACT  
DAN MARIANI (212) 551-8081  
CONTINENTAL CAN CO. INC.

### ILLINOIS

## NEED TIME

360/65 DOS 512 K-  
with 7080 Emulator  
12 Tape Drives  
16 2314 Disk Drives  
On and Off  
Line Printers  
Interested in Selling Block Time  
Five or Seven Days a Week  
Located in Chicago Central  
Business District  
Excellent Physical Facilities  
Will Provide Office & Storage  
Call (312) 225-6800, Mr. Zimmer

## COMPUTER TIME AND SERVICES

\$14.50 per hour for computer time on 360-20 with 16K and 2-2311 Disks. Systems design and RPG programming for accounting, inventory control, production management, and sales analysis at equally low rates.

Hysan Corp.  
919 W. 38th St.  
Chicago, Illinois 60609  
(312) 376-8900 X14

## IBM 360/370 USERS Computer Time Available

**370/155** 2.0 MEG, 8 3330's, 2 2314's, 10 3420 Tapes, RJE, BATCH, TSO

24 Hours-7Days  
CAN YOU BEAT  
7.24/sec for a 60K region?

**360/65** 1.5 MEG, 4 3330's, 2 2314's, 10 3420 Tapes  
8am-8pm 8pm-8am  
Not Avail \$95/hr.  
Weekdays \$60/hr. \$50/hr.  
Weekends \$60/hr. \$50/hr.  
12 hr. block \$50/hr. \$40/hr.  
weekend

**370/135** 144K, 1 2314, 4 2311, 6 3420-5 Tapes  
8am-8pm 8pm-8am  
Weekdays \$85/hr. \$55/hr.  
Weekends \$40/hr. \$35/hr.  
12 hr. block \$35/hr. \$30/hr.  
weekend

**370/135** 240K, 4 3330's, 1 2314, 6 2401-6 Tapes  
Rates same as 370/135 above.

**360/30** 64K, 6 2401 Tapes, 5 2311's  
8am-8pm 8pm-8am  
Weekdays \$50/hr. \$40/hr.  
Weekends \$33/hr. \$27/hr.

FOR FURTHER INFORMATION  
CALL PAUL SARRIS or RON ELLIS  
(312) 346-1331

**computer research company**

200 N. Michigan Ave.  
Chicago, Ill. 60601  
Largest Computer Time Sales Company

### TIME FOR SALE

### ILLINOIS

**360/55 OS-MVT-HASP**

We will give flat price contracts on jobs regardless of how much running time is involved

HF/II APT MPSX  
ICES BLISS CROSSTABS  
PICS PAYROLL SSP  
MPS PLAN SAS  
BMD

### PROJECT II

ACCOUNTS PAYABLE  
ACCOUNTS RECEIVABLE  
GENERAL LEDGER

General Purpose Simulation System  
Continuous System Modeling Program  
Urban Transportation Planning System 360

Block Time and Remote Batch  
Your Programs or Ours

**StateCom**

A Division of Statistical Tabulating Corp

(312) 346-7300  
Vern Brownworth

### IBM 360/370 USERS:

## The Cost of Computer Time Just Went Down

Going through a Conversion?  
LET GOLDEN FIFTY  
MAKE IT EASIER FOR YOU,  
AND SAVE YOU TIME  
AND DOLLARS!

**360/50** 356K, 2314 (9 spindles),  
7 3420-M7 (9 TRK 800 1600 BPI)  
1 3420-3 (7 TRK 800 BPI) 2-1403N2  
**360/50** 512K, 2314 (9 spindles),  
8-2401-M6 (9 TRK 800/1600 BPI)  
2-140361  
OFFLINE PRINTER - CPU TELETYPE  
TAPE CONTROL UNIT (1600 BPI) 1403N1

**360/50** 512 or 256K Rates  
8 A.M.-8 P.M. 8 P.M.-8 A.M.  
Weekdays \$65/Hour \$55/Hour  
Weekends \$45/Hour \$45/Hour

OFFLINE PRINTER RATES  
7 DAYS A WEEK - ALL HOURS \$20/HOUR  
ENJOY THE PRIVACY OF MODERN OFFICES SUPPLIED  
FOR DEBUGGING PROGRAMS AND RESEARCH  
Ample Storage Space Provided

Hank  
CALL: Starkey Golden Fifty  
or Dan Grey  
312/583-5410 or 5411  
COMPUTER SERVICE DIVISION  
5320 N. Kedzie Ave. • Chicago, Ill. 60625

## Software for Sale

**SYSEX**

## LOOKING FOR SOFTWARE?

Free Software Search and Package Appraisal Service

Our job is to help you locate the software packages which best meet your needs. There is no charge to you for this service. Write on your company letterhead or call:

Systems Exchange Co.  
1034 Colorado Ave.  
Palo Alto, Calif. 94303  
(415) 328-5490

**SYSEX**

### SOFTWARE FOR SALE

## AUTOCODER & SPS TRANSLATED AUTOMATICALLY to BAL & PL/1

THE **TOTALTRAN** SYSTEM

... The most economical, practical and quickest method of converting to the 3rd and 4th generation.

### 3 SERVICES OFFERED:

1. 1400 Object to clean source de-compilation
2. 1400 Clean source to BAL translation
3. 1400 Clean source to PL/1 translation

Contact: W. Small, President



**CPU MANAGEMENT  
ADVISORY CORP.**  
853 Broadway, N.Y. 10003  
(212) 777-7722

## MMS GENERAL LEDGER

is hard at work  
for over 60  
of the biggest  
US corporations\*  
TO FIND OUT  
WHAT THEY KNOW  
THAT YOU DON'T,  
CALL:

Boston 617-272-2970  
New York 212-972-9540  
Chicago 312-256-2250  
Atlanta 404-255-0039  
Los Angeles (213) 437-3301



Software  
International  
Corporation

279 Cambridge Street  
Burlington, Ma. 01803

\*so are Accounts Receivable, Accounts Payable, Inventory Management packages.

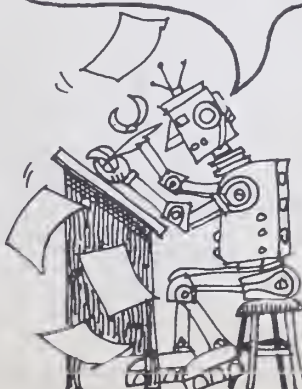
## ACCOUNTING SYSTEMS

- Accounts Receivable
- Accounts Payable
- General Ledger
- Fixed Asset
- Sales Analysis
- Report Writer

More than 80 companies are successfully and profitably using these valuable management tools. For immediate information, call collect to the office nearest you.

## INFONATIONAL

Chicago 312/986-1346  
Dallas/Ft. Worth 817/732-6603  
Los Angeles 213/383-4191  
Miami 305/666-1931  
New York 212/489-1660  
San Diego 714/238-6344  
1119 Sixth Avenue  
San Diego, Ca. 92101



## BEER BRAS BOWLING BALLS

companies in these and other industries are using our systems. Why not you?

Payroll/Personnel  
Accounts Payable

**ARGONAUT INFORMATION  
SYSTEMS, INC.**

POST OFFICE BOX 112  
WALNUT CREEK, CA.  
94596 (415) 937-4675

## CATS-A/P

ACCOUNTS PAYABLE  
CASH REQUIREMENTS

Now in operation at:

- \*a large New York bank
- \*a Midwestern conglomerate
- \*a Massachusetts manufacturer
- \*a large Southeastern bank

Under control of the CATS MASTER Systems Controller, provided FREE with the license of any of the CATS programs. Also available are: Accounts Receivable - Open Item, Accounts Receivable - Retail System, and Inventory Recordkeeping.

For information contact:  
Tom Leopard, President  
COMPUTER WARES, INC.  
P. O. Box 31205, Birmingham  
Ala 35222 - Phone 205/595-0511

## 450 COMPANIES HAVE GAINED THE COMPETITIVE EDGE WITH MSA SOFTWARE PACKAGES



- Industry User Groups
- IBM, Burroughs
- RCA, Honeywell, ICL
- Warranted Performance
- Exceptional Documentation
- Continued Enhancements

### USER ACCEPTANCE BY PRODUCT

PAYROLL/PERSONNEL-175  
GENERAL LEDGER-70  
FIXED ASSETS-140  
ACCOUNTS PAYABLE-50  
INVENTORY CONTROL-15  
(Announced 1/73)

Write or Call to Compare  
William M. Graves  
Management Science America  
3445 Peachtree Road, N.E., Suite 1300  
Atlanta, Ga. 30326

## MSA

Atlanta 404-262-2376  
New York 201-871-4700  
Chicago 312-323-5940  
Los Angeles 213-277-8411  
San Francisco 415-328-1700

## MOVING?

Please notify Computerworld at least four weeks in advance. When writing about your subscription, please enclose a recent mailing label. The code line on top may not mean much to you, but it is the only way we have of quickly identifying your records. If you are receiving duplicate copies, please send both labels.

797 Washington Street  
Newton, Massachusetts 02160

## AVAILABLE for SALE OR LEASE

F.C. 4650  
2319 Integrated  
File Adapter  
From 370/135  
Levin Computer Corp.  
(213) 553-6344

### LOW-PRICED

## acoustic coupler

MODEL 150 . . . NO FRILLS

- For use with all Series 33 TELETYPE Terminals.
- Half/full duplex switch.
- Carrier indicator.

\$147



COMDATA

7544 West Oakton Street  
Niles, Illinois 60648  
Phone: 312/692-6107

See Us In Booth 2016,  
National Computer Conference

## DEC Third Quarter Earnings Rise 68%

MAYNARD, Mass. — Digital Equipment Corp. managed a 68% increase in earnings on a 41% rise in revenues during the third quarter ended March 31.

Demand was good across the board for small-, medium- and large-scale systems, DEC said.

In the quarter, earnings reached \$6.2 million or 56 cents

a share compared with \$3.7 million or 36 cents a share in the year-ago period.

Revenues rose to \$67.4 million from \$47.7 million in the same 1972 quarter.

### Nine Months

For the nine months, earnings totaled \$14.2 million or \$1.31 a share compared with \$10.2 million or \$1 a share in the comparable 1972 period.

Revenues were \$179.2 million, up from \$131.1 million in the 1972 period.

The 1973 earnings figures include about 5 cents a share attributable to currency revaluations, DEC said.

The firm has expanded its work force, principally in the manufacturing and field service segments, and employment at the end of the quarter reached about 11,800 people, the firm said.

## Beehive Posts Earnings Gain In Six Months

SALT LAKE CITY, Utah — Record quarterly revenues sparked continuing increases in earnings for Beehive Medical Electronics, Inc.

In the six months period ended March 31, Beehive earned \$204,314 or 22 cents a share compared with \$24,302 or 3 cents a share in the year-ago period. Of the total per-share earnings for the half year, a record 12 cents a share was generated in the second quarter alone, according to President Warren B. Clifford.

Revenues totaled \$1.5 million, up 92% from \$789,550 for the same period last year.

This represents the sixth straight profitable quarter for the company and a continuance of an upward earnings trend following the first full profitable year in fiscal 1972, Clifford said.

Backlog as of March 31 totaled about \$3.7 million, he added.

## Tally Reports First Quarter Loss; Bank Extends Credit Line One Month

KENT, Wash. — Tally Corp. gained one month in which to search out a new source of short-term credit, when the National Bank of Commerce, Seattle, extended to May 31 its termination date of short-term credit to the peripherals manufacturer.

Tally President James E. Navarre told stockholders at the annual meeting that the firm's ability to continue operations depends on obtaining additional financing.

The firm sustained a loss in the first quarter ended April 1 of \$335,175 compared with a loss of \$222,022 in the same quarter a year ago.

Revenues rose to \$3.1 million

from \$2.8 million in the same 1972 quarter.

Navarre said he expects Tally will be profitable in the second quarter if "it receives no significant customer cancellations resulting from the adverse announcement about financing; if it incurs no major work stoppages through the failure of vendors to supply parts; if it is not required to reduce personnel; and if it obtains additional financing in the near future."

Tally has intensified efforts to reduce operating expenses by lowering overhead levels, consolidating certain operations and selling a money-losing subsidiary . . .," he said.

Tally recently sold its EDP Division to Standard Logic Inc. The division manufactures disk memory units.

## Nickels & Dimes

Data 100 has completed the first portion of a financing involving the private sale of 10-year 8% subordinated convertible debentures, which amounted to \$7.9 million. The second portion is expected to amount to \$2- to \$3-million, the company said. The financing will enable the firm to extend its bank lines of credit and eliminate a public financing that had been scheduled for later in 1973, a spokesman noted.

\$\$\$

In April TEC paid its first semi-annual dividend, which is in addition to the firm's 10 consecutive annual dividends.

\$\$\$

Foxboro President Earle W. Pitt told shareholders he sees shipments becoming increasingly heavy in the second quarter and half, which would support his earlier forecast of \$165 million in sales.

\$\$\$

Applied Data Research had its second consecutive quarter in which sales topped \$1 million.

\$\$\$

Name game: Terminal Equipment is now Tycom. Signetics Memory Systems, subsidiary of Corning Glass Works, now calls itself Scientific Micro Systems. It recently sold its semiconductor plant to Signetics, another Corning subsidiary, and will concentrate on the application of microelectronics to end user products.

# 6250 bpi tape subsystems dual speed/dual density



The STC 3600/3800 Series  
High Density Tape Subsystems

| model | speed (ips) | density (bpi) |
|-------|-------------|---------------|
| 3685  | 250/125     | 1600/6250     |
| 3675  | 200/100     | 1600/6250     |
| 3670  | 200         | 1600/6250     |
| 3650  | 125         | 1600/6250     |
| 3640  | 100         | 1600/6250     |
| 3630  | 75          | 1600/6250     |

- triple storage capacity per reel
- dual speed/dual density
- multitrack error correction
- increased throughput
- 1973 delivery

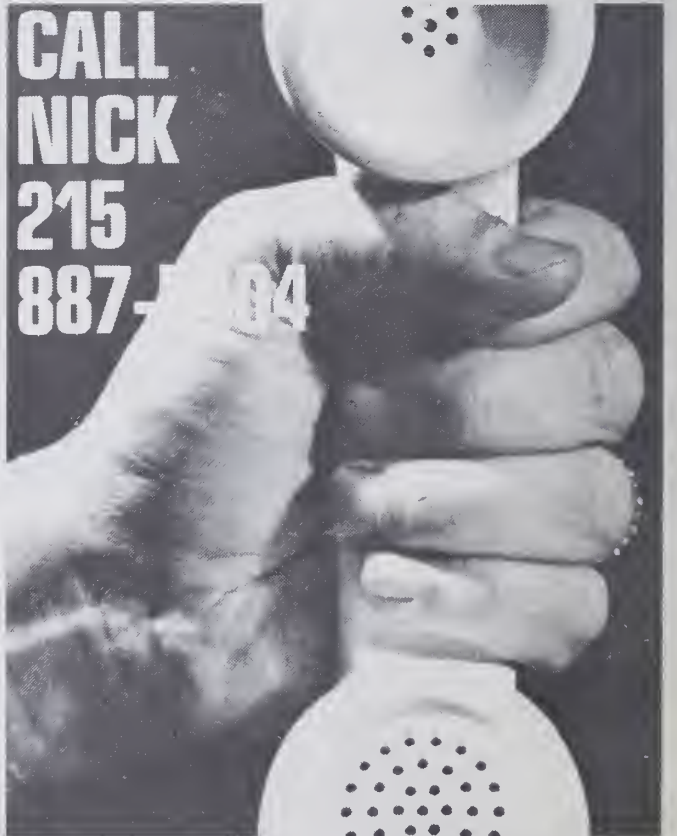
The 3600/3800 Series High Density Tape Subsystems from Storage Technology.

See us at Booth 1233/35/37 at the NCC



Always a step or two ahead.

STORAGE TECHNOLOGY CORPORATION  
2270 South 88th Street, Louisville, Colorado 80027, (303) 666-6581



Nick Cicchitti: If you need it — He's got it!  
Hot Line Special this week IBM 360

FOR SALE — IBM 3420's AVAILABLE — JUNE 1, 1973  
UNDER IBM MAINTENANCE

| Qty. | Model/Feature  | Description                      |
|------|----------------|----------------------------------|
| 5    | 3420 7<br>6631 | Mag. Tape Unit<br>Single Density |
| 2    | 3420 7<br>3550 | Mag Tape Unit<br>Dual Density    |
| 1    | 3803 1<br>3551 | Tape Control<br>Dual Density     |

**NVC** COMPUTER SALES, INC.  
Suite 616, Benjamin Fox Pavilion  
Jenkintown, Pa. 19046 • (215)-887-5404

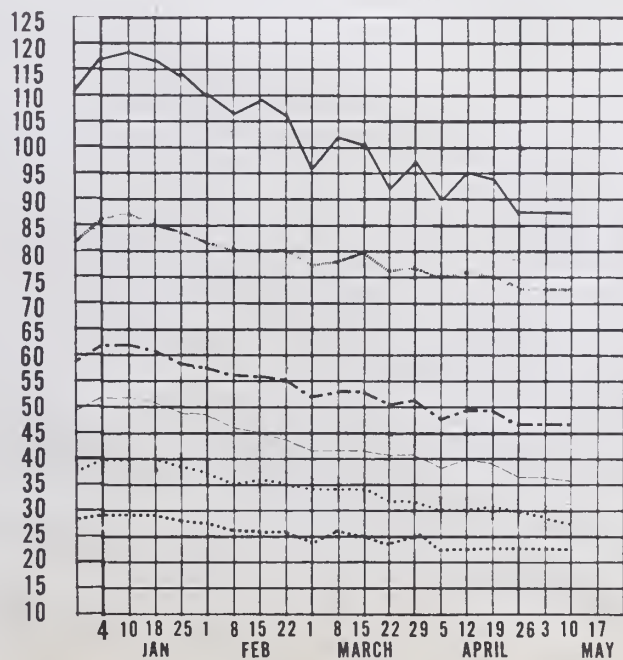
TRADE\*QUOTES<sup>®</sup>Computerworld  
Stock Trading SummaryAll statistics  
compiled, computed  
and formatted by  
TRADE\*QUOTES, INC  
Cambridge, Mass 02139

CLOSING PRICES THURSDAY, MAY 10, 1973

| E<br>X<br>C<br>H         |                      | PRICE  |  |        |        | E<br>X<br>C<br>H |
|--------------------------|----------------------|--------|--|--------|--------|------------------|
|                          |                      | 1973   |  | CLOSE  | WEEK   |                  |
|                          |                      | RANGE  |  | MAY 10 | NET    |                  |
|                          |                      | (1)    |  | 1973   | CHNGE  | PCT<br>CHNGE     |
| SOFTWARE & EDP SERVICES  |                      |        |  |        |        |                  |
| O                        | ADVANCED COMP TECH   | 1- 2   |  | 1 1/4  | - 1/4  | -16.6            |
| A                        | APPLIED DATA RES.    | 3- 4   |  | 2 3/4  | - 1/4  | -8.3             |
| O                        | APPLIED LOGIC        | 2- 3   |  | 1 5/8  | - 1/8  | -7.1             |
| N                        | AUTOMATIC DATA PROC  | 65- 94 |  | 73 3/4 | - 7/8  | -1.1             |
| O                        | BRANDON APPLIED SYST | 1- 1   |  | 5/8    | 0      | 0.0              |
| O                        | COMPUTER DIMENSIONS  | 2- 5   |  | 4 1/4  | - 1/4  | -5.5             |
| O                        | COMPUTER DYNAMICS    | 1- 2   |  | 5/8    | 0      | 0.0              |
| O                        | COMPUTER NETWORK     | 2- 5   |  | 1 1/2  | 0      | 0.0              |
| N                        | COMPUTER SCIENCES    | 2- 6   |  | 3 1/8  | - 3/8  | -10.7            |
| O                        | COMPUTER TASK GROUP  | 1- 2   |  | 1 3/8  | + 3/8  | +37.5            |
| O                        | COMPUTER TECHNOLOGY  | 2- 3   |  | 1 3/4  | - 1/8  | -6.6             |
| O                        | COMPUTER USAGE       | 5- 9   |  | 5 3/4  | 0      | 0.0              |
| O                        | COMRESS              | 1- 2   |  | 1/4    | - 1/8  | -33.3            |
| O                        | COMSHARE             | 5- 9   |  | 5 3/8  | - 1/8  | -2.2             |
| N                        | COROURA CORP         | 6- 15  |  | 7 3/4  | + 3/8  | +5.0             |
| O                        | DATATAB              | 3- 4   |  | 2 1/4  | 0      | 0.0              |
| O                        | EDP RESOURCES        | 1- 3   |  | 1 1/8  | - 1/8  | -10.0            |
| A                        | ELECT COMP PROG      | 1- 2   |  | 1 1/4  | 0      | 0.0              |
| N                        | ELECTRONIC DATA SYS. | 35- 56 |  | 39 1/8 | +1 7/8 | +5.0             |
| O                        | INFORMATICS          | 2- 6   |  | 2 3/4  | + 1/8  | +4.7             |
| O                        | I.O.A. DATA CORP     | 1- 1   |  | 3/4    | 0      | 0.0              |
| O                        | KEANE ASSOCIATES     | 3- 4   |  | 3      | 0      | 0.0              |
| O                        | KEYDATA CORP         | 7- 12  |  | 6 3/4  | - 1/8  | -1.8             |
| O                        | LOGICON              | 4- 7   |  | 4 1/4  | - 3/8  | -8.1             |
| A                        | MANAGEMENT DATA      | 2- 5   |  | 2      | 0      | 0.0              |
| O                        | NATIONAL CSS INC     | 8- 41  |  | 25     | -1     | -3.8             |
| O                        | NATIONAL INFO SVCS   | 1- 2   |  | 1 1/8  | 0      | 0.0              |
| P                        | ON LINE SYSTEMS INC  | 13- 17 |  | 14 3/4 | +2     | +15.6            |
| N                        | PLANNING RESEARCH    | 3- 7   |  | 3 1/2  | - 1/4  | -6.6             |
| O                        | PROGRAMMING METHODS  | 22- 24 |  | 23 1/4 | +1 1/4 | +5.6             |
| O                        | PROGRAMMING & SYS    | 1- 1   |  | 7/8    | 0      | 0.0              |
| O                        | RADIOATA INC         | 13- 24 |  | 12 3/4 | - 1/4  | -1.9             |
| O                        | SCIENTIFIC COMPUTERS | 1- 2   |  | 1      | 0      | 0.0              |
| O                        | SIMPLICITY COMPUTER  | 2- 4   |  | 3 1/2  | + 3/8  | +12.0            |
| O                        | THE COMPUTER CENTERS | 3- 4   |  | 2 3/4  | - 1/8  | -4.3             |
| O                        | TCC INC              | 1- 1   |  | 1/2    | 0      | 0.0              |
| O                        | TYMSHARE INC         | 7- 12  |  | 7 5/8  | + 5/8  | +8.9             |
| O                        | UNITED DATA CENTER   | 5- 6   |  | 4 1/4  | - 1/4  | -5.5             |
| N                        | UNIVERSITY COMPUTING | 6- 11  |  | 6 1/8  | - 3/4  | -10.9            |
| A                        | URS SYSTEMS          | 4- 8   |  | 4 3/4  | + 1/8  | +2.7             |
| PERIPHERALS & SUBSYSTEMS |                      |        |  |        |        |                  |
| N                        | ADDRESSOGRAPH-MULT   | 16- 34 |  | 16 1/8 | -2 1/4 | -12.2            |
| O                        | ADVANCED MEMORY SYS  | 8- 23  |  | 8 1/4  | -5     | -37.7            |
| N                        | AMPEX CORP           | 4- 7   |  | 4 1/2  | - 1/4  | -5.2             |
| O                        | ANDERSON JACOBSON    | 4- 6   |  | 4 1/4  | - 3/4  | -15.0            |
| O                        | BEEHIVE MEDICAL ELEC | 6- 10  |  | 7 1/2  | -1     | -11.7            |
| A                        | BOLT-BERANEK & NEW   | 8- 12  |  | 8      | + 1/4  | +3.2             |
| N                        | BUNKER-RAMO          | 6- 18  |  | 14 5/8 | + 7/8  | +6.3             |
| A                        | CALCOMP              | 9- 13  |  | 9      | - 1/2  | -5.2             |
| O                        | CAMBRIAGE MEMORIES   | 10- 15 |  | 11     | +1 1/2 | +15.7            |
| O                        | CENTRONICS DATA COMP | 13- 28 |  | 22 1/4 | 0      | 0.0              |
| O                        | CODEX CORP           | 11- 19 |  | 13     | +1 1/2 | +13.0            |
| O                        | COGNITRONICS         | 1- 3   |  | 2      | 0      | 0.0              |
| O                        | COMPUTER COMMUN.     | 2- 4   |  | 1 5/8  | - 1/8  | -7.1             |
| A                        | COMPUTER EQUIPMENT   | 2- 3   |  | 2 7/8  | + 3/8  | +15.0            |
| O                        | COMPUTER MACHINERY   | 8- 13  |  | 8 1/4  | 0      | 0.0              |
| O                        | COMPUTER TRANSCIVER  | 2- 6   |  | 1 7/8  | - 1/8  | -6.2             |
| A                        | COMPUTEST            | 3- 5   |  | 4 7/8  | + 1/8  | +2.6             |
| N                        | CONRAC CORP          | 18- 32 |  | 18 7/8 | - 3/8  | -1.9             |
| A                        | DATA PRODUCTS CORP   | 3- 4   |  | 2 3/4  | - 1/4  | -8.3             |
| O                        | DATA RECOGNITION     | 2- 3   |  | 1 1/2  | 0      | 0.0              |
| O                        | DATA TECHNOLOGY      | 2- 5   |  | 2 5/8  | + 1/8  | +5.0             |
| O                        | DI/AN CONTROLS       | 2- 4   |  | 2 3/8  | 0      | 0.0              |
| N                        | ELECTRONIC M & M     | 3- 6   |  | 4      | - 1/4  | -5.8             |
| O                        | FABRI-TEK            | 3- 5   |  | 3      | - 1/4  | -7.6             |
| O                        | GENERAL COMPUTER SYS | 6- 9   |  | 5 3/4  | + 1/4  | +4.5             |
| N                        | GENERAL ELECTRIC     | 59- 76 |  | 61     | + 7/8  | +1.4             |
| N                        | HAZELTINE CORP       | 7- 9   |  | 7 1/8  | + 1/8  | +1.7             |
| O                        | INFOREX INC          | 12- 23 |  | 15 1/2 | + 1/4  | +1.6             |
| O                        | INFORMATION DISPLAYS | 1- 2   |  | 3/4    | - 1/4  | -25.0            |
| O                        | INFORMATION INTL INC | 11- 15 |  | 11     | 0      | 0.0              |
| A                        | LUNOY ELECTRONICS    | 4- 9   |  | 4 7/8  | + 1/8  | +2.6             |
| O                        | MANAGEMENT ASSIST    | 1- 1   |  | 3/8    | 0      | 0.0              |
| A                        | MILGO ELECTRONICS    | 17- 28 |  | 19 3/4 | +1     | +5.3             |
| N                        | MOHAWK DATA SCI      | 5- 13  |  | 4 7/8  | + 1/8  | +2.6             |
| O                        | OOEC COMPUTER SYST.  | 3- 6   |  | 3 1/4  | 0      | 0.0              |
| O                        | OPTICAL SCANNING     | 2- 7   |  | 3 3/4  | + 1/4  | +7.1             |
| O                        | PERTEC CORP          | 5- 8   |  | 6 3/4  | +1 1/2 | +28.5            |
| O                        | PHOTON               | 3- 7   |  | 3 3/4  | 0      | 0.0              |
| A                        | POTTER INSTRUMENT    | 4- 9   |  | 4 1/2  | - 1/2  | -10.0            |
| O                        | PRECISION INST.      | 2- 6   |  | 3 1/2  | 0      | 0.0              |
| O                        | RECOGNITION EQUIP    | 4- 8   |  | 5 1/4  | - 1/4  | -4.5             |
| N                        | SANDERS ASSOCIATES   | 8- 18  |  | 8 5/8  | + 1/8  | +1.4             |
| O                        | SCAN DATA            | 2- 6   |  | 2      | - 1/8  | -5.8             |
| O                        | STORAGE TECHNOLOGY   | 17- 34 |  | 17     | -2 1/2 | -12.8            |
| O                        | SYCOR INC            | 9- 14  |  | 13 1/2 | +1 3/4 | +14.8            |
| O                        | TALLY CORP.          | 3- 14  |  | 3 1/2  | - 1/4  | -6.6             |
| N                        | TEKTRONIX INC        | 34- 53 |  | 36 3/4 | +1 3/4 | +5.0             |
| N                        | TELEX                | 4- 6   |  | 3 3/4  | - 1/8  | -3.2             |
| O                        | WILTEK INC           | 13- 18 |  | 11 3/4 | - 1/4  | -2.0             |
| SUPPLIES & ACCESSORIES   |                      |        |  |        |        |                  |
| O                        | BALTIMORE BUS FORMS  | 5- 9   |  | 6 3/4  | - 1/2  | -6.8             |
| A                        | BARRY WRIGHT         | 8- 13  |  | 8      | - 1/4  | -3.0             |
| A                        | DATA DOCUMENTS       | 18- 22 |  | 20     | + 1/2  | +2.5             |
| O                        | DOUPLEX PRODUCTS INC | 8- 10  |  | 7 3/4  | 0      | 0.0              |
| N                        | ENNIS BUS. FORMS     | 6- 8   |  | 5 3/4  | 0      | 0.0              |
| O                        | GRAHAM MAGNETICS     | 13- 20 |  | 13 3/4 | +1 1/8 | +8.9             |
| O                        | GRAPHIC CONTROLS     | 10- 12 |  | 10 3/4 | + 7/8  | +8.8             |

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE  
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER  
P=PHIL-BALT-WASH  
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. ON LAST B10  
(1) TO NEAREST DOLLAR

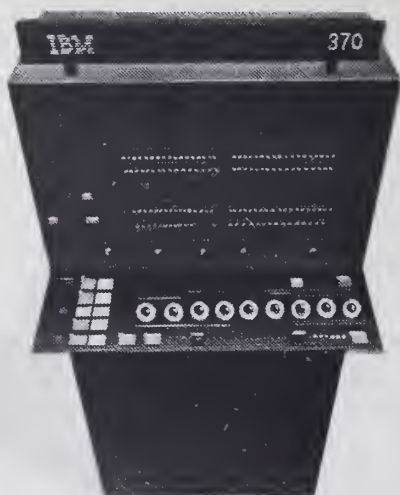
## COMPUTER STOCKS TRADING INDEX

— Computer Systems      ----- Software & EDP Services  
..... Peripherals & Subsystems      ..... Leasing Companies  
..... Supplies & Accessories      ----- CW Composite IndexEarnings  
Reports

|                            |           |           |  |
|----------------------------|-----------|-----------|--|
| COMDISCO                   |           |           |  |
| Three Months Ended Dec. 31 |           |           |  |
|                            | 1972      | 1971      |  |
| Shr Ernd                   | \$ .26    | \$ .10    |  |
| Revenue                    | 5,286,079 | 2,771,588 |  |
| Earnings                   | 285,011   | 98,501    |  |

| ELECTRONIC MEMORIES<br>& MAGNETICS |            |              |  |
|------------------------------------|------------|--------------|--|
| Three Months Ended March 31        |            |              |  |
|                                    | 1973       | a1972        |  |
| Shr Ernd                           | \$ .27     | .....        |  |
| Revenue                            | 24,743,000 | \$16,621,000 |  |
| Disc Op                            | .....      | (19,000)     |  |
| Tax Cred                           | 744,000    | .....        |  |
| Earnings                           | 1,700,000  | (635,000)    |  |
| a-Restated.                        |            |              |  |

# FOR \$26,123 A MONTH, IBM WILL RENT YOU THIS:



# FOR \$25,022 A MONTH, ITEL WILL LEASE YOU THIS:



The big difference between IBM and ITEL shows up on your financial statement.

As an example, for \$26,123 a month, IBM rents you a System/370 Central Processing Unit alone, but for \$25,022, ITEL will give you the 370 CPU plus one megabyte of AMS Monolithic Memory, 8 ITEL disk drives plus controller, as well as 8 ITEL tape drives and one controller.

A full computer system for less than the IBM cost of the CPU alone.

Rented from IBM, the same complete system would cost you \$51,405 per month, more than

double the ITEL cost.

And that's only one example. We'll lease any kind of computer package (360 or 370) on 3- to 8-year terms at proportional savings. Which explains why we have \$300 million of IBM computer equip-

ment on lease right now.

When you're making a data processing move, you'll save big by calling the Data Products Group at ITEL—the financial alternative to IBM.

## ITEL CORPORATION

One Embarcadero Center, San Francisco, Calif. 94111  
(415) 989-4220

I'm interested. Please send me more detailed information.

Name

Title

Company

Phone

Address

City

State

Zip

C-516